# ELECTRICAL REVIEW

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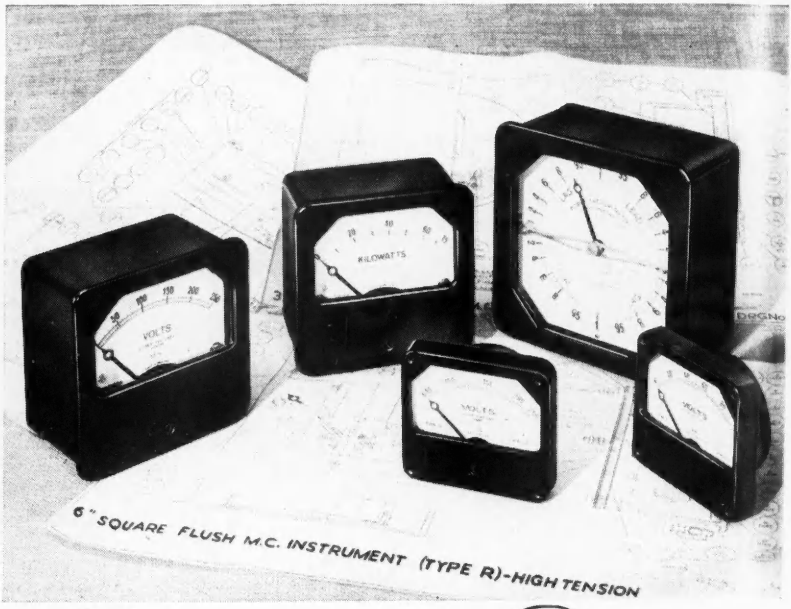


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ELECTRICAL REVIEW

18th JULY, 1952

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872 • VOL. CLI • NO. 3895

# Mining Electrical Engineers

As a measure of the increase in responsibilities of electrical engineers in the coal mining industry, the growth in the number of motors installed, great as it has been since pre-war days, viz., from 55,000 to last year's 94,000, is quite inadequate. The merely numerical advance is being accompanied by greater diversity in the functions and greater ratings of machines, which foreshadow the accelerating developments needed to meet future demands for coal with limited manpower.

Because of the specialized nature of much of the new equipment, in particular at the coal face, little help in its selection and maintenance can be expected from experience in other industries. Precise specification of what is required of a wide variety of often more complicated and heavier plant, therefore, introduces an exacting test of the high order of technical skill required of those responsible for its operation.

Coping with this situation will entail much higher levels of training than in the past, Mr. E. H. Browne, Director-General of Production, National Coal Board, reminded the recent conference of the Association of Mining Electrical and Mechanical Engineers. While more professional electrical engineers with the highest academic qualifications will be required, the most urgent need is to provide technical education of a more practical kind, though with an adequate theoretical background, for the essential and larger class of technicians. Another question he raised was whether an electrical or mechanical engineer should be in control. This, he holds, should depend upon individual ability, since in any case the senior man is assisted by those with special experience in various branches. The possession of electrical qualifications in addition to the usual background of mechanical training is an advantage which should, in our view, give the electrical engineer first claim to consideration. Of quite equal importance is an aptitude for combining local executive authority with the carrying out of the requirements of

specialists, a somewhat delicate matter to which the speaker devoted the attention it merits.

It should encourage young entrants to the industry to have Mr. Browne's authoritative opinion that electrical and mechanical engineering should be given better status and more scope than it has been accorded in the past. This very desirable end, he points out, will depend upon the engineers themselves and will come only as a result of conviction by colliery managements that the efficient running of the pits is due to an engineering service of the highest calibre.

## COAL PRICES

The extent to which the electricity supply industry has for many years subsidized other coal users is indicated in the Report of the Industrial Coal Consumers' Council for the year ended 30th June. The Council approved the revised price structure of the National Coal Board (particulars of which were given in our issue of 20th June) as establishing a more scientific and commercial relationship between various types of coal based on heat value and with allowance for ash. From 1940 onwards flat-rate additions (for administrative convenience), totalling 30s a ton, to pit-head prices, which before 1935 ranged from 10s to 25s, have heavily penalized the burning of low-grade coal in electric power stations.

## ROAD LIGHTING

The importance of good lighting in reducing the toll of the roads has again been stressed. The Ministry of Transport Road Safety Committee which has inquired into the tragic accident at Gillingham last December when twenty-four cadets lost their lives finds that the lighting of Dock Road was "very poor" and that had it been adequate the marching column would have been seen and avoided. The Committee expresses the view that the general question of street lighting improvements merits special attention and that local authorities should give primary consideration to thoroughfares carrying a large volume of mixed traffic; where necessary, they should be assisted from central funds. It might be added that many schemes are held up for lack of Ministerial sanction; surely these restrictions should be relaxed?

## BUILDERS AND ELECTRICITY

It is twenty-one years since the Building Centre, which now has counterparts in Scotland and abroad, was founded in London by and with the support of architects and builders. Its prime functions are consultative and advisory: a central source of information and assistance about most things that go into the erection, decoration and equipment of buildings of all kinds, unbiased by any financial interest in sales, for neither materials nor equipment can be ordered there. The Electrical Section of the new premises, opened last week, is similarly conceived —and very well designed it is, too— to be likewise educational in purpose. It will benefit most the architectural student, using that word in its broadest sense. The new premises is happily situated, close to the hub of the University of London with building schools and representatives of the architectural profession in the same vicinity—an encouraging augury, for designers are now realizing that if buildings are to have adequate electrical services proper accommodation must be made for them.

We regret that in some copies of last week's issue eight pages were incorrectly placed. Editorial pages 59–66 followed advertisement page 58 instead of editorial page 58. Attention should be called to this misplacement when having the copies bound.

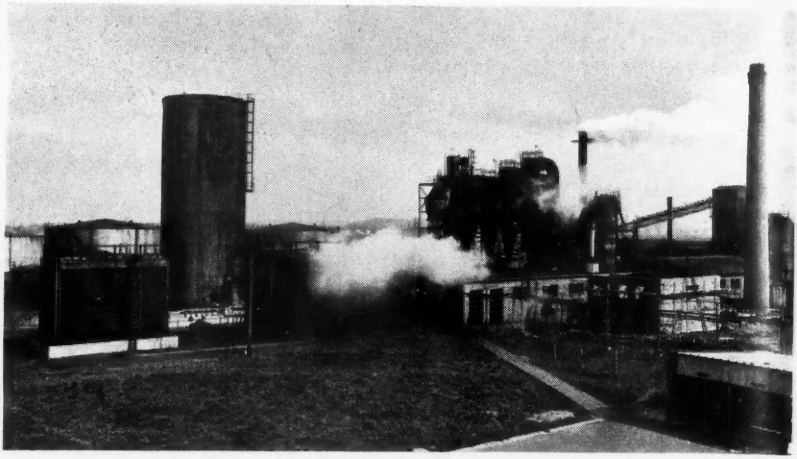
## *Electrical Method of Manufacture Utilizing Precipitation*

THERE is probably no material more widely used in everyday life of which most people are totally unaware than carbon black. Yet it is an important ingredient of such diverse products as steel, fertilizers, printing ink, dry batteries, paints, explosives, insulated cables, plastics, carbon papers, typewriter ribbons and all rubber articles needing to be tough and long wearing, such as tyres and inner tubes, soles, heels, garden hose and gaskets. Nearly a thousand million pounds of carbon black are used every year for tyres, 3–4 lb trebling the road life of an average car tyre. In fact, more than 20 lb of carbon black finds its way into the components of every car.

Until the recent war, carbon black was developed solely from natural gas, which restricted production to such localities as the south western part of the United States where large quantities of this gas are available. The method used, the channel process as it is called, involves thousands of small flames of natural gas burning against steel channels and causing the carbon black to deposit on the surface of the steel. In view of the increased cost of natural gas and the advent of synthetic rubber, recent developments have led to a vast expansion of the so-called furnace process, in which liquid hydrocarbon raw materials are burnt in specially designed furnaces under controlled conditions. The carbon black particles produced in the form of smoke are then separated from the furnace exhaust gases, usually by electrical precipitators and cyclones. To-day the major supply of carbon black is divided evenly between these two methods of manufacture.

Until a couple of years ago the bulk of the carbon black used in this country had to be imported, but with the development of the new furnace technique which is independent of natural gas it has become practicable to establish production plants here. Two of these are already in operation, one at Avonmouth operated by Philblack, Ltd., and the other at Stanlow operated by Cabot Carbon, Ltd. We were recently given the opportunity to visit the

**Above: The carbon black is automatically weighed into paper bags**



**A general view of the Cabot Carbon factory at Stanlow**

latter installation, extensions to which already in hand will more than double the production of carbon black and will permit the manufacture of other grades of product. Here the raw material used, imported from the United States, is an aromatic tar residue. The liquid is pumped from the docks 2 miles away through 10in pipes to three storage tanks (one 9,000 ton and two 4,500 ton), both pipes and tanks being steam heated to 80–90 deg F. Transfer pumps (driven by 7½ h.p. motors) are used to pump the tar from one tank to the other or to two smaller tanks (39,000 gall), each of which is of sufficient capacity for one day's operation of the plant. These smaller tanks are kept at a temperature of about 130 deg F to reduce viscosity, while a steam heated dehydration plant comprising two electric (4 h.p.) and one steam pump filters off moisture.

"Petrochem" heaters, operated by diesel oil and tail gas, raise the temperature of the tar when it is atomized by means of high pressure air from an Ingersoll Rand compressor driven by a 175 h.p. motor fitted with Ellison starter and B.I.C.C. power factor condenser; the compressor is cooled by a water circulating system embodying a 3 h.p. pump.

The atomized tar is introduced into refractory lined furnaces (of which there are sixteen) together with low pressure air from Sturtevant fans (7½ h.p. motors) each fan serving a pair of furnaces. In these furnaces, at temperatures above 2,500 deg F, partial combustion takes place under carefully controlled conditions provided by a flowmeter (Solway Flowrators, Ltd.) governing the tar feed and Bristol instruments covering the h.p. and l.p. air. In the event of a power failure solenoid valves (British Thermostat Co., Ltd.) automatically cut off the tar supply.

The flues from the furnaces meet in a manifold and the gases carry the suspended carbon black up a stack where water sprays (provided by a 12½ h.p. pump) reduce the temperature to about 400 deg F. The water is totally evaporated and the product remains dry since the gases are well above dewpoint.

The cooled dry gases containing the carbon in the form of a heavy smoke are then passed through two 25 kVA, 75 kV Cottrell dry precipitators constructed and installed by the Research Corporation. Three 25 kVA, 400 V/75 kV single-phase Westinghouse (U.S.A.) transformers provide the necessary h.v. supply, each of the two rotary convertors installed being of sufficient capacity to operate both precipitators if necessary. An overcurrent relay is incorporated in the control system.

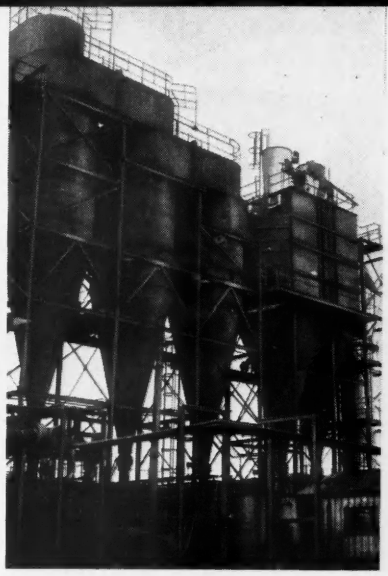
Agglomeration of the fine carbon particles occurs in the electrostatic field but generally only a small proportion of black is removed at this stage, the precipitated black falling

back to the bottom into a stainless steel worm conveyor. The principal action of the precipitators is the flocculation of the black into aggregates which remain in the gas stream. This stream is passed through a set of three cyclone collectors in which the carbon black is removed by centrifugal action.

About 95 per cent of the carbon black suspended in the gases is extracted by this means, the "fluffy black carbon," as it is called, falling to the bottom of the collectors and being carried via a worm conveyor bucket elevator, hammer mill (35 h.p. 2,900 r.p.m. motor) and storage tank to "pelletizers." The level of the carbon in the storage tank, which is kept agitated by means of a 10 h.p. motor, is shown by indicator lamps.

The 5 per cent of carbon black still remaining in the gases leaves the third cyclone collector in the form of smoke. A recovery plant provided not only produces more carbon black but also eliminates all smoke and furnishes sufficiently clean fuel to fire the central heating boilers, to heat the rotary dryers and to preheat the liquid raw material.

In this recovery plant the gases, after passing through a blower, water spray and scrubber, go to a 25 kVA, 75 kV wet electrostatic precipitator, similar to the units already referred to. In this case, however, two rotary convertors are provided, one being available as a spare. The wet

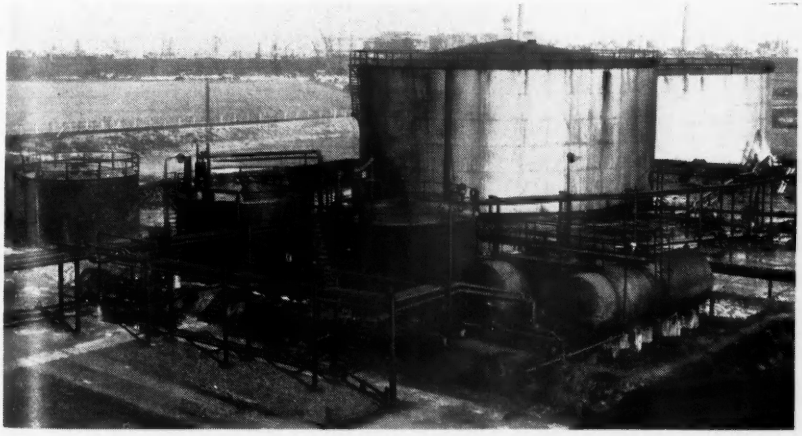


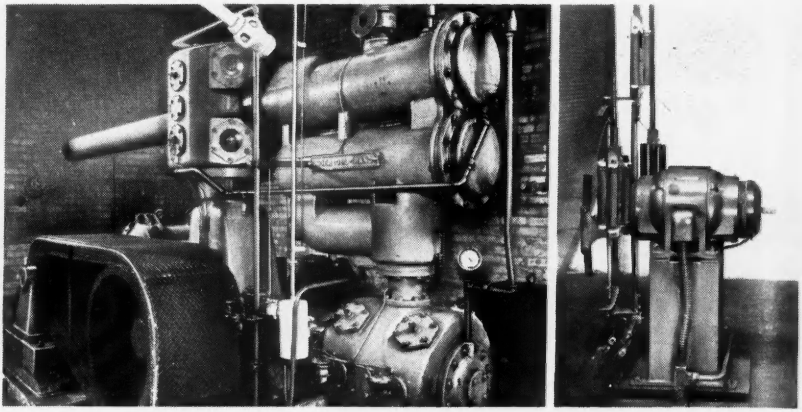
**The three cyclone collectors with the two electrostatic dry precipitators on the right**

black is precipitated, resulting in a slurry which passes through a thickener to the pelletizers.

A 10 h.p. geared motor is employed to drive each pelletizer which is fundamentally a shaft with helically disposed spokes rotating in a horizontal cylinder. As the dry carbon black is admitted to this cylinder the wet slurry is sprayed in to form pellets,

**Heated storage tanks for the raw material with filtration plant in left foreground**





**Compressor with a 175 h.p. motor used for atomizing the tar and** *(right)* **h.v. rotary convertor used for one of the electrostatic precipitators**

varying from $\frac{1}{32}$ to $\frac{1}{16}$in in diameter, which have the advantage of occupying much less space than the fluffy form (about 22 lb/cu ft compared with 3 lb/cu ft). These pellets are then treated in rotary dryers whence they are taken via an elevator and 12in conveyor to a " Boxmag " magnetic separator (Electromagnets).

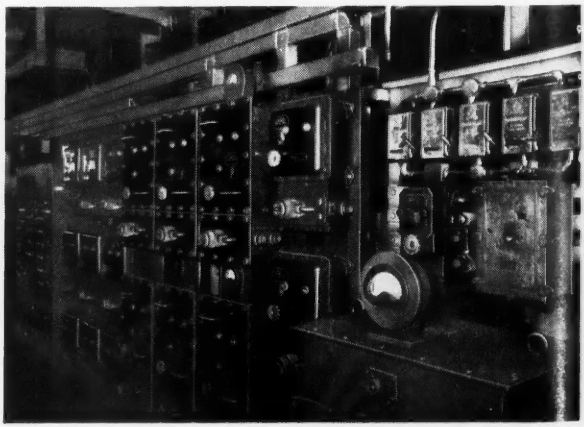
A vibrating screen then feeds the carbon black on to an 18in conveyor which by means of a series of ploughs distributes it to one of the three storage hoppers. Klaxon sirens give warning of accumulations of carbon black at various points in the trunking which houses the conveyor. From the storage hoppers the pellets are automatically weighed into 50 lb paper bags which are then stitched on portable machines.

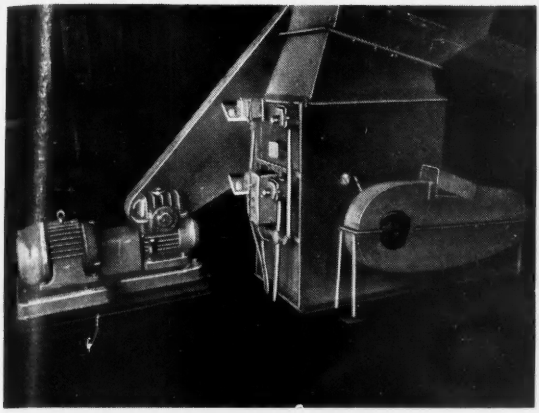
The packing department is kept as clean and tidy as possible by the use o a B.V.C. vacuum cleaning plant. As from safety considerations no permanent lighting is permitted in the warehouse " Blaizolite " portable lights (Warrington and Landon) are connected to special protected type Walsall switch sockets.

Although for this type of plant the works may be considered " clean " it is inevitable that workers should get dirty. Ample changing and washing facilities are provided, with four Bendix washing machines to deal with soiled garments and towels.

At present the factory load is about 600 kVA but the extensions will raise the demand to 2,000 kVA. The electricity

**Flameproof motor starting gear for the " pelletizing " plant**





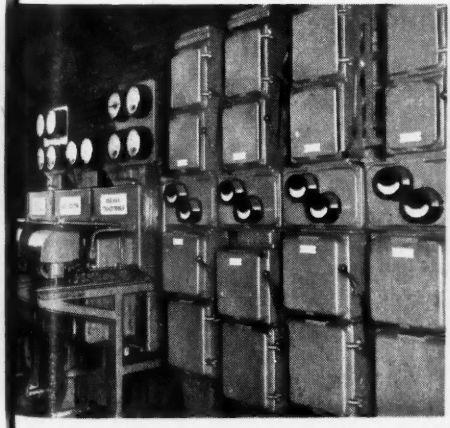
**Magnetic separator for removing ferrous material from the carbon black before packing**

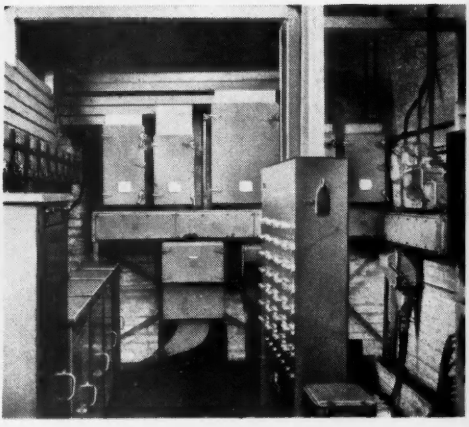
supply is received from the Merseyside and North Wales Electricity Board via Switchgear and Cowans h.v. switchgear (with Alklum tripping gear) and two 1,000 kVA, 6,000/400/230 V transformers (one Brush, one Bonar Long). The l.v. supply from each transformer is taken to Reyrolle G.1 main switches with a bus-section between. HH type switchgear controls the circuits to the various sections of the plant.

To secure correct sequence of operation when starting up the plant the control gear for all processes up to the pelletizing is grouped in a brick-built control room adjoining the electrostatic precipitator plant. An alarm siren and indicating lamps give warning of any failures or stoppages. The sequence control equipment, as well as the motor starters throughout the factory, were supplied by Allen West & Co., Ltd.; flameproof starters have been installed in the pelletizing plant. Power Centre trunking and English Electric sub-distribution boards have been used. All the motors, which have been supplied by the British Thomson-Houston Co., Ltd., are of the totally enclosed type with terminal boxes specially designed to keep out the carbon black. The Holophane lighting fittings selected are found most suitable for excluding the carbon black. Fluorescent lighting employing Crompton fittings has been provided in the control room. The electrical contractors were Denton Electric, Ltd.

We thank Cabot Carbon, Ltd., for permission to visit the works, and members of its staff for help in preparing this article.

*Left:* **L.v. main switchgear and sub-switchgear.** *Right:* **To secure correct sequence of operations when starting up the plant the control gear for all processes up to the pelletizing is grouped here**





# NEW BOOKS

**Sound Recording and Reproduction.** By J. W. Godfrey and S. W. Amos, B.Sc., A.M.I.E.E. Pp. 271; figs. 176; plates 10; index. Published for *Wireless World* by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 30s.

This book has been written primarily as an instruction manual for the use of engineering staff of the B.B.C., but it will no doubt be of value to many other engineers as it is the most comprehensive text-book on the technique of sound recording so far published. In writing the book the authors have had the collaboration of M. J. L. Pulling, M.A., M.I.E.E., K. R. Sturley, Ph.D., B.Sc., M.I.E.E., and P. J. Guy, Associate I.E.E., all of whom are members of the B.B.C. Engineering Division.

The book commences by setting out the principles of electrical recording and reproduction, after which disk recording is discussed with a detailed description of the B.B.C. and American Presto now in operation in British broadcasting services. Chapters follow on the reproduction of disks and pressings and the processing of disks. The principles of magnetic recording are next explained with descriptions of the Marconi-Stille, Magnetophon and E.M.I. systems which have been used at different times by the B.B.C. Recording on film is then treated with reference to the Philips-Miller equipment. There are a number of appendices containing much information not readily available elsewhere.—R.P.

**D.C. Power Systems For Aircraft.** By R. H. Kaufmann and H. J. Finison. Pp. 206; figs. and index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 40s in U.K.

This book is another in the American General Electric series of technical publications. It gives a realistic step-by-step build-up of the ideal system for generation and distribution of a d.c. installation and leads the reader, by well-worded text matter and ample graphs, to a complete "how-it-all-works" understanding of the subject, without too much mathematical theory.

On the application of system protection, the uses of the reverse-current and balanced-current circuit breakers are amply dealt with and supply a welcome addition to the information available on the subject in view of their coming application to British aircraft. Installation pitfalls are also ably treated, and the illustrations showing the result of short circuit arcs on the surrounding structure should do much to impress upon the installation engineer how much the safety of an aircraft depends on his careful attention to detail.

There are far too few books on aircraft systems and this volume can be thoroughly recommended to both the designer and student alike. If any criticism can be made it is that, although the authors state at the beginning that it is a d.c. system they describe, a short comparison with other systems would have been useful in view of the installation weight controversy which is very much the concern of the aircraft electrical designer.—A.B.

**The Engineer's Approach to the Economics of Production.** By John Reid Dick, B.Sc., M.I.E.E. (248 pp.). Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 21s.

The author of this book, who was chairman of W. Lucy & Co., Ltd., unfortunately died before its publication. Mr. Dick was deeply interested in economic affairs and the book is the result of many years of study and thought. He regarded economics as "the means for a rational and impartial examination of industrial activities."

The book is a guide to the best paths of study and it deals with the factors making for engineering efficiency and productivity. It is shown that a design can be technically right but economically unsound—a fact not always appreciated by the designer and one which is a strong argument for some form of economic training. Much is said about the right choice of machines and materials, introducing the "law" of substitution, and cogent electrical examples are given.

Throughout the rest of the book it is demonstrated how closely engineering and economics are identified and the whole of the matter is treated in a new and interesting way. The index is thorough: indeed, Gallio has been included because he is mentioned as caring for none of those things.—J.H.C.

# Treatment of Silicosis

## *Chemical Inhalation Assisted by Electrostatic Field*

By Dr. ING. E. ROSENTHAL, M.I.E.E., F.R.I.C.

A NEW form of treatment for alleviating the suffering of industrial workers who are affected by silicosis—indeed, a means which may afford a certain degree of protection to workers likely to become affected in those mines and ceramic factories where there is very fine quartz dust (silicic acid: $SiO_2$)—was seen by the author during a recent visit to Germany.

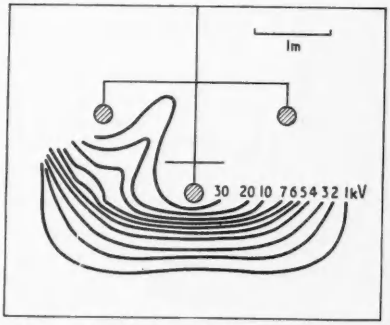
At the Rosenthal porcelain factory in Selb, Bavaria, where the three accompanying photographs were taken, a special building has been prepared wherein the workers are able to sit in their ordinary working clothes and inhale calcium salts in solution.

There is nothing new in inhalation for curative purposes but, in the case of the method about to be briefly described, a quite new technique—developed by German doctors, mining engineers of the Krupp "Hannibal" mines in Westphalia and the firm of Elektro-Aerosol—is used.

It is explained, first of all, that the human lung is made up of honeycomb-like cells which receive their supply of air through the bronchial tubes. In various industries where very fine quartz dust is breathed in by the workers serious lung trouble often occurs. In association with the crystal surfaces of small quartz particles are free electrons and they are able to combine with the molecules of the albumen of the lung (a compound of carbon, nitrogen, hydrogen and oxygen) so as to form organo-silicon compounds.

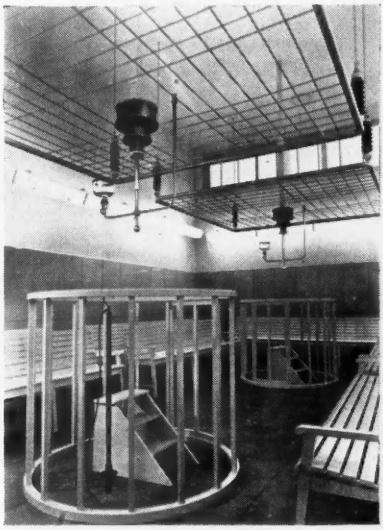
The consequences cause difficulty in breathing, gasping noises, coughing during the night, sleeplessness, tiredness and, of course, inability to work. It has been found, moreover, that the smaller the quartz particles, the more active they are and the more are the workpeople inclined to become affected by silicosis.

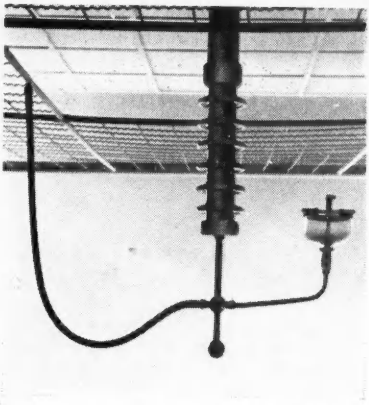
The treatment employed in Germany is one in which workers are able to inhale minute droplets of calcium salts in solution,




**Voltage distribution within the inhalation chamber**

**Treatment room showing discharge bushings with salt solution container *(left)* and 60 kV connector *(right)* between spray tube and overhead grid suspended on insulators from the ceiling**





**An earlier ceiling bushing with** *(left)* **60 kV grid connector and** *(right)* **salt solution container**

of the order of a hundredth of a micron in size only. This fine mist penetrates deeply into the lungs and combines with the inbreathed silica dust, forming calcium silicate, which is said to be non-injurious to the lung structure.

Should the reader question how it is that the albumen is not combined under these circumstances, it may be explained that the affinity of silicic acid towards calcium salt is greater than the affinity of silicic acid towards albumen, so the calcium silicate does not combine with albumen.

In the inhalation rooms in Germany wire mesh is suspended from the ceiling and insulated therefrom. The mesh is charged negatively with d.c. at 60 kV, which is derived from the ordinary factory a.c. distribution mains and converted by passage through step-up rectifying equipment.

At the bottom of the bushing insulator, shown projecting downward through a central aperture in the wire mesh screen illustrated, is a small hollow sphere. Through three horizontal narrow slots in this sphere calcium salt spray is injected into the room by means of compressed air passing vertically down the bushing insulator. As the droplets leave the sphere, they disintegrate into very minute particles due to the heavy electric charge, the electrons repelling each other. The minute droplets of salt spray are thus uniformly distributed and held in suspension in the negatively-charged field between the upper wire mesh and the ground, so that the workers are able to breathe them into their lungs while resting in the room reading their papers. An important point to note is that ordinary droplets of sprayed calcium salt solution would not penetrate deeply into the lungs, because of their size; hence the value of this treatment. Apart from this chemical explanation of the beneficial effect obtained by inhalation of electrically charged calcium salt sprays, there are also other theories to explain this. In the view of the inventor of the jet, H. Bartel, and of Kuester, Frankfurt Main, and of other scientists like Professor Dessau, the penetration of electrons deep into the alveoles is the main healing factor. The chemical structure of the electrical charge carriers is, in the opinion of these scientists, of minor importance.

The doctors supervising the treatment in the Aerosol inhalation plants are of the opinion that the chemical and electrical influences combine to cause the preventive and/or healing effects. There are now six inhaling plants in operation in the German coal-mining industry (all in the Ruhr), one in a German porcelain factory (Rosenthal) and one in a Swedish porcelain insulator factory (IFOE).

In the treatment room at Selb there are seats for 70 workers and after two sittings of thirty minutes each patients say they can sleep again at night. The designers of the apparatus have a two-fold aim: to alleviate and to prevent silicosis. Besides silicosis, bronchitis, asthma, and whooping-cough have been treated with quick success by this method. In the treatment of many thousands of patients, irritation of the aerial passages was never observed. It is hoped that mines and factories in other countries may shortly also benefit from similar installations of this unique apparatus.

**Newer form of vertical sprayer on porcelain bushing through which compressed air is delivered**

# British Food Fair

## Electricity's Part in Food Preservation, Preparation and Packaging

THE unrivalled service provided by electricity in the preservation, preparation and packaging of foodstuffs is much in evidence at the British Food Fair which until to-morrow is being held at Olympia, London. Applications in the home, works canteen and restaurant are demonstrated in a compact theatre on the Electrical Development Association's stand, where are displayed examples of all the leading makes of cookers from breakfast to "family" size, as well as such devices as kettles, coffee percolators, toasters and warming plates.

A special feature of the stand is a section equipped as a modern coffee stall, gaily canopied, complete with a variety of electrical aids to good catering, including a small cooker, refrigerator, coffee machine, toaster, waffle maker, hotcupboard, bread slicer, juice extractor, liquidizer, deep fat fryer and glass washing machine. Food preparation by electrical methods also forms the theme of further demonstrations viewed through a glass window, while an inquiry desk is provided to help visitors with food problems.

An exhibit in which the Minister of Food, Major G. Lloyd-George, showed particular interest during his visit on 5th July was a cooker incorporating a simple mechanism enabling a standard cooker to be modified so that the blind can cook successfully even the most elaborate meal. This device, which the General Electric Co., Ltd., is supplying without charge for use on any new cookers supplied to the blind, tells by means of differently toned bells not only when the oven is "on" or "off" but when the desired temperature is reached. An indicator button on the switch panel also emerges when the oven is switched on and recedes when the required temperature is reached. The cooker is being demonstrated by a sightless person.

Electrical appliances of all kinds for cooking, mixing, refrigeration, etc., are seen in operation on the stands of food exhibitors but there are also a number of individual electrical manufacturers with their own displays. Kenwood Electrics, Ltd., for example, show both their "Chef" mixer with its latest attachments, the potato peeler and coffee grinder, and also the "Chef Major," their new cabinet type commercial model.

On the commercial side the S.B. Engineering Co., Ltd., shows two new items of interest to food and confectionery manufacturers. A shuttle conveyor, particularly suitable for the bakery trade for the rapid cooling of pies, cakes, etc., accommodates an extraordinarily large quantity of produce while itself occupying little floor space. The

*Above:* **Miss Marguerite Patten, B.B.C. television cookery expert, assisted by Miss Muriel Shorrock (North Western Electricity Board), 1952 winner of the E.D.A. public speaking contest, pointing out the advantages of an automatic tea-making set on the E.D.A. stand**

other new item, a "small piece" cooling conveyor, permits the immediate packing of toffees, etc., after wrapping. A further exhibit is a scale model of a one ton an hour quick freezing plant at Smedleys' factory at Wisbech.

The detection of metal in foodstuffs is given considerable prominence. The new "Cintel" multi-channel unit shown by Cinema-Television, Ltd., is smaller, lighter, more compact and more sensitive than its predecessors. It has been specially designed for applications where a large number of detectors are required, controlling up to six separate conveyor lines with independent alarm systems for each. Another new multi-channel unit is shown by Loma Electronic Equipment, Ltd., together with a range of products which are being safeguarded with its "Metaltector" installations.

Two types of electronic detectors are demonstrated by Goring Kerr: the standard model for fitting to a conveyor band and the "Junior" unit designed for metal detection in extruded products such as toffee "rope" where a small aperture search head with high sensitivity is required. Products of Rapid Magnetic Machines, Ltd., include permanent and electromagnetic separators; magnetic trips for treating soups and other liquid or semi-liquid products; magnetic grids for installing in floor openings, hoppers, spouts, etc., where coffee, tea, spices or grain are being stored; electromagnetic chutes for treating fine powders; drum type separators; hinged and stationary permanent plate magnets; and floor sweeping magnets.

Besides demonstrating a machine for cleaning currants, sultanas, etc., Caleb Duckworth, Ltd., show a machine for cleaning and polishing glass jars at a rate of 3,000 an hour; rotary fillers, including a new small mincemeat filler with a capacity of 900 jars an hour; and a 1,800 an hour fully automatic vacuum seal capping machine. Sealing machines are also shown by Thomas Hunter, Ltd. New universal wrapping machines introduced by Forsters Machine Co., Ltd., are designed to change over from one packet size to another within a few minutes, using heat sealing if required. Newman labelling machines are seen in operation on Brand & Co.'s stand. Various models of "Masseeley" marking machines are demonstrated by Masson Seeley & Co., Ltd., while Dapag (1943), Ltd., makes a feature of label, ticket tag and carton printing machines.

**Cooker control unit for blind persons being demonstrated**

Flies, moths and other insects are a particular nuisance and danger to health in all places concerned with the preparation of food. A remedy is to be found in the use of the "Aerovap" electric volatizer (Shepherd's Aerosol, Ltd.), or the "Velatox" fly and moth killer (Associated Fumigators, Ltd.), the latter fitting on to any ordinary lamp bulb.

## Electric Whaling Trials

TRIALS of considerable importance to the progress of the electrical method of killing whales are being carried out this month off the Norwegian coast. Sir Vyvyan Board and fellow directors of United Whalers, Ltd., and Mr. Robert Marsden of the General Electric Co., Ltd., are taking part in the expedition, which will precede further South African and Antarctic work. This expedition is concerned in the main with the development of the Westley Richards spigot harpoon gun, employing the new light electrical fore-runners made by the Pirelli-General Cable Works. The completed equipment is the outcome of continuous experiments, over a period of five years, in which the G.E.C. has been actively engaged.

# VIEWS on the NEWS

## By REFLECTOR

ANOTHER and perhaps final chapter in the history of the Drumm battery, which it was hoped might revolutionize rail and road transport, was closed recently by the demolition of its premises in Dublin. Invented by Dr. Drumm, of Dublin, this special form of alkaline accumulator, which comprises positive plates containing nickel oxides and negative plates of zinc, is capable of high discharge rates. For some years its development was subsidized by the Irish Government and one Dublin railway service was in fact operated by it for a time. However, the scheme proved to be too costly and was eventually abandoned as uneconomic.

* * *

The British Electricity Authority and Area Boards are much-abused bodies but I have yet to see anything about them approaching the following, which is a quotation from a manifesto of the American "Electric Consumers' Conference" (quoted by the *Electrical World*):—

> "The private power industry in America must be cleansed. Although its illegal, immoral and degrading activities were exposed and condemned only two decades ago, the unreformed and unrepentant industry given a privileged monopoly position to supply a necessity of our lives, is to-day again charging and expending ratepayers' money as operating expense to corrupt public sources of information, educational institutions, public agencies and the functioning of our democratic institutions."

The reference is to the power companies' self-defence propaganda, which, if it is typical, the quoted passage seems to justify.

* * *

Some determined attacks have recently been made on the present hire-purchase restrictions, but all traders do not appear to be in agreement on this point. A correspondent tells me that at a meeting of the Dewsbury Chamber of Commerce one member condemned hire-purchase as being "the worst thing ever to have come into the country." He thought that some people got so much on hire-purchase that they found themselves short of money for their ordinary purchases and then sought to get an advance in wages. This is the first time that I have heard "h.p." blamed for the rise in the cost of living (for each wage increase of course means a dearer product).

* * *

Unusual tasks come the way of electricity supply officials at times and none more so than that successfully tackled by the North of Scotland Hydro-Electric Board. An emergency call was received at the Board's Aberdeen office from a farmer who had lost one of his pedigree sows after it had farrowed. Within half an hour engineers from the Board had arrived at the farm with an electric "foster mother" to feed the thirteen young pigs. A recent report in the local Press records that ten have survived and are fast developing into good "baconers."

* * *

With regard to my note on page 1394 of the 27th June issue dealing with domestic and commercial refrigerators, Mr. E. G. Batt, director and secretary of the British Refrigeration Association, points out that under arrangements which the industry has with H.M. Customs and Excise, even if a domestic consumer has the money and the space he is not permitted to purchase a refrigerator in excess of 12 cu ft—in other words, one which does not attract purchase tax.

* * *

Reference is made in the *Indian Electrical Contractor* to an exhibition of Japanese goods held in Bombay which included diesel engines, transformers, switchgear, capacitors and electrical accessories. This is evidence of reviving Japanese activity in the Indian market (which is to be expected) and, the journal says, "a sure indication of India's desire for more extensive trade relations with the 'Britain of the East.'" I am not sure that I like the implication of that last phrase.

# Colne Valley Sewerage

*Inauguration of Regional Scheme*

FORMAL inauguration of what is now the Colne Valley Sewerage Board's treatment and disposal works at Maple Lodge, near Rickmansworth, Herts, took place on 12th July.

The scheme originated in 1933 at which time Greater London drainage was under consideration by the Ministry of Health which envisaged the setting up of ten regional boards for the remodelling of sewerage and the disposal of sewage throughout Hertfordshire.

The Colne Valley Board's scheme, which adjoins the West Middlesex main drainage area,* was resumed after the war and has from time to time since May, 1951, been accepting at Maple Lodge flows of sewage from Amersham, Chorley Wood, Rickmansworth, Bushey, Leavesden, Watford, Boreham Wood, Elstree, St. Albans and Redbourne.

The scheme is estimated to cost £6·25 million, will serve an area of 150 sq miles and will result in the closing down of 26 local sewage works. Since most of the 55 miles of trunk sewers are below river level, all sewage is pumped before treatment and the purified effluent flows to the river by gravity. Vertical spindle centrifugal pumps in dry wells are gravity primed and directly coupled through steel shafting to driving motors at ground level. They are controlled automatically on the "Noflote" system, all dry weather flow pumps having two-speed motors. All power for pumping is generated at Maple Lodge and transmitted by underground cables to the various pumping stations.

A feature of the preliminary treatment is the regulation, by sewage level above the measuring flume, of the motors operating the penstocks in the grit channels and those driving the comminutors (machines of American design, but made in England) for disintegrating solid matter without removal from the sewage flow.

All the electricity needed for lighting, pumping, air compressing and other power purposes is generated in the power house at Maple Lodge, which also accommodates all the electrical control equipment, metering and recording apparatus, etc. Each of the present six sets consists of a National dual-fuel diesel engine of about 700 h.p. capable of burning sludge gas, fuel oil, or a mixture of both. Each is coupled to a 750 kVA alternator generating at 3·3 kV. After transmission to outlying stations, the power is transformed down for normal use.

The main contractors were:—High- and low-voltage distribution cables and control systems: British Insulated Callender's Cables, Ltd. Power transformers: Bruce Peebles, Ltd. Alternators and compressor motors: Crompton Parkinson, Ltd. Low-voltage distribution switchgear: George Ellison, Ltd. Distribution and control gear, 3·3 kV: Ferguson, Pailin & Co., Ltd. Low-voltage distribution and motor control switchgear: Watford Electric & Mfg. Co., Ltd. The wiring and cabling was carried out by J. W. Russell & Co., Ltd.

The chief engineer is Mr. W. F. Brown and the mechanical and electrical engineer Mr. H. W. G. Mitchell. The consultants were Messrs. Sandford Fawcett & Partners.

* *Electrical Review*, 11th December, 1936.

## New "Tube" Cars

A NEW type of "Underground" car is being introduced on London Transport's Northern and Bakerloo lines to operate with the 1938 tube stock. It is fitted with simplified driver's control equipment for shunting purposes. Hitherto it has been the practice for this stock to be made up into three- and four-car units having a driving cab at each end so that a seven-car train can be divided into two separate units. In most cases when trains are reduced in length after the peak service only one unit remains in service. By eliminating one of the cabs, at the point where the only driving facility required is such as to enable a unit to be shunted to or from depot, and substituting a passenger door, the rapid loading of passengers is greatly facilitated and cost is reduced. The driving equipment is housed in a cabinet let into the end panel similar to the normal arrangement of the guard's door control equipment.

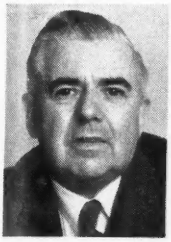
# PERSONAL and SOCIAL

## *News of Men and Women of the Industry*

THE Minister of Fuel and Power has appointed **Mr. H. G. Partridge,** M.A., J.P., of Cardigan, as a member of the South Wales Electricity Board. He is a prominent member of the National Farmers' Union.

**Mr. G. A. Nott,** of Tenbury Wells, has been appointed a part-time member of the Midlands Electricity Board.

**Mr. H. W. Bowen,** O.B.E., M.I.Mech.E., M.I.P.E., has accepted the appointment of managing director of the Britannic Electric Cable & Construction Co., Ltd. Mr. Bowen recently resigned from the position of managing director of the E.M.I. Factories, Hayes, Middlesex. He took up his new appointment on 7th July. Mr. Bowen has had a distinguished engineering career and is well known on both sides of the Atlantic.



**Mr. H. W. Bowen**

**Mr. V. L. F. Davies,** A.M.I.E.E., has retired from the position of deputy station superintendent at the Stoke power station of the British Electricity Authority after forty years' service in the industry. Mr. Davies joined the Stoke-on-Trent Corporation in 1914, and was transferred to the N.W. Midlands J.E.A. on its formation in 1930. He was appointed deputy station superintendent at Stoke in 1948.

**Mr. C. R. King,** president of the Electrical Industries Benevolent Association, and Mrs. King, were invited by H.M. Queen Elizabeth to attend the first Royal Garden Party on 10th July, in recognition of their services to the E.I.B.A.

**Mr. N. C. Robertson,** M.B.E., Director General of Electronics Production, Ministry of Supply, and deputy managing director of E. K. Cole, Ltd., accompanied by Mrs. Robertson, was also a guest at the Royal Garden Party.

On 27th June, **Dame Caroline Haslett,** who has been presiding at the fifteenth annual board meeting of the International Federation of Business and Professional Women in New York, presented to President Truman at the White House in Washington a party of some sixty delegates representing twenty countries. Afterwards the party lunched at the Capitol with the women members of Congress, and later that afternoon visited the Senate and House of Representatives, where they heard a debate in both houses. They flew from New York to Washington and back in specially chartered planes. From New York Dame Caroline and other overseas delegates went on to Boston for the biennial conference of the American Federation of Business and Professional Women's Clubs. Dame Caroline is also attending the biennial convention of the Canadian Federation in Vancouver.

**Mr. F. A. Callaby** has been appointed financial controller of the Westinghouse Brake & Signal Co., Ltd. He will be directly responsible to the managing director.

**Dr. W. I. Pumphrey,** M.Sc., Ph.D., F.R.S.A., manager of the Research Department of Murex Welding Processes, Ltd., has been made a Freeman of the City of London and a Liveryman of the Worshipful Company of Blacksmiths.

**Mr. A. G. Salisbury** is retiring from the Motor Engineering Department of the British Thomson-Houston Co., Ltd., at the end of the current month after forty-four years' service with the company. Mr. Salisbury pioneered the design development of fractional h.p. motors at the B.T.H. Coventry Works, and was appointed engineer-in-charge in 1932 when the design-engineering work was transferred to Rugby. He received his early technical training at the Merchant Venturers' Technical College, Bristol, and joined the B.T.H. Co. as a special apprentice in 1904, working in the Meter Department, Rugby, of which he became chief draughtsman when the Department was transferred to Coventry in 1912. His work later extended to car and aero magneto design when the latter were in active development during the first

**Mr. A. G. Salisbury**

world war. From 1919 to 1923 Mr. Salisbury was with Vickers, Ltd., on similar work, but returned to the B.T.H. Co. at Coventry as design engineer in charge of magnetos and motor cycle and car lighting, before starting his work on f.h.p. motor design.

**Mr. G. B. Proctor,** B.Sc.Tech.(Hons.), A.M.I.E.E., has been appointed managing director of Transformers & Welders, Ltd. Since 1944 Mr. Proctor has been transformer sales manager to Ferranti, Ltd., with whom he has been since 1929. He is a member of various B.E.A.M.A. and B.E.A./B.E.A.M.A. Committees dealing with transformers and is vice-chairman of the B.E.A./B.E.A.M.A. No. 2 Committee (Transformer Standardization).

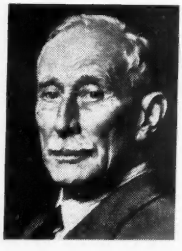
**Mr. G. B. Proctor**

**Mr. W. C. Stevens** has been re-elected, unopposed, as general secretary of the Electrical Trades Union.

In glorious weather **G. A. Harvey & Co. (London) Ltd.,** held their annual sports meeting on 28th June. Over 2,000 employees and friends attended and there was a comprehensive programme of athletic and novelty events. A well-supported fun fair helped to create a gala atmosphere. The chairman, Mr. S. Harvey, accompanied by Mrs. Harvey, attended, and others present were Mr. and Mrs. G. C. Harvey and Mr. and Mrs. H. E Cooper. Among the guests were the Mayor and Mayoress of Greenwich, Councillor H. Ingle, J.P., and Mrs. Ingle.

In our last issue we reported the retirement of **Mr. H. C. Booth,** F.C.G.I., M.I.C.E., from the chairmanship of the British Vacuum Cleaner & Engineering Co., Ltd., and the appointment of **Mr. J. J. Hambidge** as the new chairman of the company. We now reproduce their portraits.

**Mr. H. C. Booth**



**Mr. J. J. Hambidge**

The annual sports meeting of Smart & Brown (Machine Tools), Ltd., C.W.C. Equipment, Ltd., Tenaplas, Ltd., and Clark & Bridle, Ltd., was held on 6th July, when 800 employees spent an enjoyable outing in the grounds of Brasted Place, Brasted, Kent, the residence of Mr. Edmund Howeson, chairman of Smart & Brown (Machine Tools) and C.W.C. Equipment. The prizes were distributed by Mrs. John Howeson, chairman of Tenaplas, Ltd.

The annual staff outing of **F. Westerman (Wholesale), Ltd.,** Birmingham, was held on 5th July, when a party of 40 visited Matlock by coach.

**Mr. H. Watson-Jones,** M.Eng., M.I.E.E., M.I.Mech.E., M.I.Min.E., chief engineer of the Durham Division, National Coal Board, has been elected national president of the Association of Mining Electrical & Mechanical Engineers for the session 1952-53.

**Mr. H. Watson-Jones**

Mr. Watson-Jones was born in Liverpool in 1899 and received his early practical training with the Mersey Docks and Harbour Board. During the 1914-18 war he served in the Royal Navy and later took the degree of Master of Engineering at Liverpool University. He joined the staff of Metropolitan-Vickers Electrical Co., Ltd., in 1923, as a postgraduate college apprentice and later was employed as an installation engineer with the American Westinghouse Co. in Pittsburgh, U.S.A. He returned to the works as senior engineer in the General Engineering Department, dealing with power generation plant, railway traction and steelworks electrification, etc. In 1937 he was appointed manager of the Birtley Co., Ltd., Co. Durham, and returned to Metropolitan-Vickers in 1939 as head of the Mining Department. On the nationalization of the mining industry in 1947, Mr. Watson-Jones joined the North Western Divisional Coal Board as chief mechanical and electrical engineer, and in 1950, when the old Northern Division was split, he took over his present appointment as divisional chief engineer (electrical and mechanical) to the new Durham Division.

He has served on the North Western Centre Committees of the I.E.E., and I.Mech.E., and is at present a member of the North Eastern Centre Committee of the I.E.E. He is also actively concerned in the progress of education in the mining industry.

Chosen to lead the British ladies' high board (10 metres) diving team at Helsinki is **Miss Diana Spencer,** aged eighteen years, the

daughter of Mr. C. Spencer, assistant works manager, G.E.C. of India (Mfg.), Ltd., Calcutta.

**Mr. T. G. Martin**, T.D., M.I.E.E., chief electrical and mechanical engineer of Cyrenaica, Libya, has joined the Kuwait Oil Co. as senior electrical and mechanical engineer at Kuwait. Mr. Martin's last duty in Cyrenaica was to commission the first portion of the new Benghazi power station, and in the accompanying picture he is seen receiving King Idris of Libya on his arrival for the ceremony. In the foreground is Mr. K. H. Tuson, M.I.Mech.E., M.I.E.E., of Messrs. Mackness & Shipley, consulting engineers.

**King Idris of Libya being received by Mr. T. G. Martin at the opening of the first portion of the new Benghazi power station**

**Mr. Y. A. Fazalbhoy** has been re-elected president of the Electrical Contractors' Association, Bombay, for a third term.

The Council of Southampton University has appointed **Dr. L. G. A. Sims** as senior lecturer and head of the Department of Electrical Engineering.

**Mr. F. Pooley**, M.I.E.E., chairman of Pooley & Austin, Ltd., electrical wholesalers, and Mrs. Pooley, celebrated their golden wedding on Wednesday last.

The directors of British Insulated Callender's Cables, Ltd., announce that they have accepted with regret the resignation of **Mr. P. V. Hunter**, C.B.E., Hon.M.I.E.E., from the position of deputy chairman as from 31st August. At that date Mr. Hunter will be in his seventieth year and he desires to reduce his commitments. He will, however, continue to serve as a non-executive director, and at the request of the company will remain on the boards of several of the subsidiary companies, where his long experience and technical knowledge will be of special value.

**Mr. P. V. Hunter**

**Mr. W. E. Miller**, M.A., editor of the *Wireless and Electrical Trader*, has been nominated as president-elect of the British Institution of Radio Engineers. He has been a member for twenty years, was chairman of the Council in 1945-48, and subsequently became a vice-president. Recently Mr. Miller visited Paris when he discussed with several prominent radio engineers the possibility of forming a section of the Institution in France.

About 5,000 people attended the annual gala day held recently at the Erith Works by the Athletic and Social Club of **British Insulated Callender's Cables, Ltd.** The opening ceremony was performed by Jon Pertwee, the comedian, who arrived in a helicopter and later crowned Miss Sylvia Statham, of Helsby, as the 1952 B.I.C.C. beauty queen. A full afternoon and evening of entertainment included a dressed vehicle procession which made a tour of the borough, an archery display, knife-throwing act, performing dogs, square-dancing and gymnastics displays. There were also a number of competitions, a horticultural and handicraft exhibition, and a photographic and painting display. Music was provided by Callender's Cable Works Band. Among the guests were Ald. and Mrs. C. F. Morling (deputy mayor and deputy mayoress of Erith), and a number of B.I.C.C. directors, including Mr. P. V. Hunter (deputy chairman) and Mrs. Hunter.

The **Johnson & Phillips** annual sports and gala held at the company's sports ground last Saturday provided entertainment for about 1,200 of the company's employees and their friends. Forty events included the annual tug-of-war challenge match between Telcon and J. & P. which resulted in a win for Telcon; three challenge races for teams from the London Business House A.F.A. which were won by representatives of Lyons, Siemens and J. & P.; and the J. & P. departmental shield, won by the Switchgear Department. Further entertainment in the form of side shows, etc., was also provided. The prize-giving was conducted by Mrs. Passmore, wife of Mr. S. J. Passmore, a director of J. & P. After the athletic events, the gathering was entertained by dance music and impromptu stage turns.

## OBITUARY

**Mr. D. R. G. Mason,** A.M.I.E.E.—The death occurred on 7th July of Mr. D. R. G. Mason, Aberdare and Mountain Ash district engineer of the South Wales Electricity Board, who received a fatal electric shock at the Hirwaun Trading Estate, Aberdare. Mr. Mason, who was thirty-six, was in the Electricity Department of the Mountain Ash Urban District Council before becoming district engineer to the Board.

**Mr. S. Poultney,** manager of the Nottingham office of the Hotpoint Electric Appliance Co., Ltd., died on 27th June at the age of fifty-seven. Mr. Poultney joined the company as sales representative and was at one time manager of the Southampton office. During the war he took up duties with the Police Reserve and with the Ministry of Aircraft Production, rejoining the company at the Nottingham office in 1950 and becoming manager in 1951.

## WILLS

**Sir Andrew Rae Duncan,** an outstanding figure in the British steel industry, and chairman of the Central Electricity Board from 1927 to 1934, who died on 30th March, left personal estate in England and Scotland valued at £48,088.

**Mr. W. Weygood,** Associate I.E.E., retired electrical engineer, formerly chief engineer of the Midland Electric Corporation for Power Distribution, Ltd., who died on 28th January last, left £15,320 gross (£15,200 net).

**Mr. Wilfrid L. Randell,** consulting editor, editor-in-chief of the Electrical Press, Ltd., 1925-35, who died on 5th May, left £6,634 gross (£6,485 net).

**Mr. B. E. Todhunter,** O.B.E., J.P., a director of Murex, Ltd., who died on 25th May, left £225,014 gross (£218,133 net).

**Mr. C. Rees,** who served with the former Bournemouth and Poole Electricity Supply Co. for many years, and who died on 29th February, left £10,187 gross (£9,107 net).

**Mr. W. M. Armstrong,** A.M.I.E.E., of Sutton, Surrey, late of Heaton, Newcastle-upon-Tyne, who died on 21st March last, left £3,254 gross (£3,121 net).

**Mr. G. H. Charter,** formerly for many years employed by the English Electric Co., Ltd., who died on 14th March, left £5,605 gross (£5,534 net).

**Mr. J. H. Millen,** M.I.E.E., late Chief Electrical Engineer, L.P.T.B., Ministry of Labour Control Commission for Germany and Regional Controller, Ministry of Fuel and Power, London, who died on 30th April last, left £3,328 gross (£3,208 net).

**Mr. J. D. Howell,** formerly for thirty years manager of the Weston-super-Mare branch of Bristol Tramways & Carriage Co., who died on 11th February last, left £1,554 gross (£1,495 net).

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# A.P.L.E. Conference

THE annual conference and exhibition of the Association of Public Lighting Engineers will be held at Harrogate from 16th to 19th September. The official opening will be performed by Councillor A. V. Milton, Mayor of Harrogate. In addition to the presidential address by Mr. E. Howard (city lighting engineer, Nottingham) papers to be presented are "Methods of Controlling Street Lighting," by N. Axford (district manager, South Western Electricity Board, Plymouth), "Illuminations and Decorative Lighting," by H. Carpenter (illuminations and public street lighting officer, Blackpool), "Street Lighting—U.S.A.", by Dr. A. F. Dickerson (general manager, Lighting and Rectifier Department, General Electric Co., U.S.A.), "Street Lighting—A Wise Compromise," by N. Hudson, and "Design, Manufacture and Erection of Concrete Lighting Columns," by Dr. D. F. Orchard.

The annual general meeting will precede the official opening of the conference and other arrangements include a civic reception by the Mayor of Harrogate, the annual luncheon, and a reception by the president and Mrs. Howard.

The exhibition of street lighting apparatus and equipment will be housed in a marquee adjacent to the Royal Hall (conference hall) and in the grounds there is also to be a display of lamp columns, bollards, traffic signs, etc.

The following have indicated their intention of participating:—

Automatic Telephone & Electric Co., Ltd.; Beresford Atkinson, Ltd.; Bright, Son & Co. (Clerkenwell), Ltd.; British, Foreign & Colonial Automatic Light Controlling Co., Ltd.; British Electrical Development Association; British Thomson-Houston Co., Ltd.; Concrete Utilities, Ltd.; Costain Concrete Co., Ltd.; Crompton Parkinson, Ltd.; Edison Swan Electric Co., Ltd.; Engineering & Lighting Equipment Co., Ltd.; Ford Motor Co., Ltd.; Gas Council; General Electric Co., Ltd.; Gowshall, Ltd.; Holophane, Ltd.; Horstmann Gear Co., Ltd.; Imperial Chemical Industries, Ltd.; John Kerr & Co. (Manchester), Ltd.; R. A. Lister & Co., Ltd.; Parkinson & Cowan (Gas Meters), Ltd.; Philips Electrical, Ltd.; Poles, Ltd.; Revo Electric Co., Ltd.; Rheostatic Co., Ltd.; Shaftesbury Ladders, Ltd.; Siemens Electric Lamps & Supplies, Ltd.; Springbank Quarry, Ltd.; Stanton Ironworks Co., Ltd.; Stewarts & Lloyds, Ltd.; Wm. Sugg & Co., Ltd.; Tarslag, Ltd.; Thorn Electrical Industries, Ltd.; Vauxhall Motors, Ltd.; Venner, Ltd.; Wokingham Plastics, Ltd.

# I.E.E. Elections

## *New President, Council and Section Chairmen for* 1952–53

THE President for the ensuing year of the Institution of Electrical Engineers is Col. B. H. Leeson, O.B.E., T.D., M.I.E.E., who is well-known throughout the electrical industry as Director of the British Electrical and Allied Manufacturers' Association.

Col. Leeson was educated at Battersea Polytechnic and received his electrical training with Siemens Bros. Dynamo Works. During the 1914–18 war he served as Divisional Engineer, R.N.D., and after the war joined A. Reyrolle & Co., Ltd., with whom he was responsible for the formation of the technical and research department. He was also associated with the establishment of the first British short-circuit testing station and the standardization of switchgear performance, and represented Great Britain at I.E.C. meetings on this subject. He was closely concerned with the formation of the Association of Short-Circuit Testing Authorities. Col. Leeson was appointed joint manager of Reyrolles in 1937 and in the following year became a director.

**Col. B. H. Leeson**

He commanded the Tyne Electrical Engineers, R.E., and served in the last war from 1939 to 1940, being released in the latter year to become general manager of Reyrolles, and in 1945 he was appointed managing director. He was chairman of the I.E.E. North-Eastern Centre in 1930 and has been a member of the I.E.E. Council and a vice-president since 1948.

To fill the two vacancies of vice-president, Mr. J. Eccles, C.B.E., B.Sc. (chairman, Merseyside and North Wales Electricity Board) and Mr. T. E. Goldup (director, Mullard, Ltd., Mullard Radio Valve Co., Ltd., and Mullard Equipment, Ltd.), have been elected. Mr. H. W. Grimmitt (deputy chief engineering inspector, Electricity Division, Ministry of Fuel and Power), has been elected hon. treasurer.

The vacancies on the Council have been filled as follows:—Members: Messrs. C. Dannatt, O.B.E., D.Sc. (assistant managing director and director of research and education, Metropolitan-Vickers Electrical Co., Ltd.), O. W. Humphreys, B.Sc. (director, Research Laboratories, General Electric Co., Ltd.), A. H. Mumford, O.B.E., B.Sc.(Eng.) (Assistant Engineer-in-Chief, G.P.O.), and Prof. M. G. Say, Ph.D., M.Sc. (Professor of Electrical Engineering, Heriot-Watt College). Associate members: Messrs. H. R. L. Lamont, Ph.D., M.A., B.Sc. (senior lecturer in electronics, Department of Electrical Engineering, Royal Technical College, Glasgow), and G. Lyon, M.Sc.(Eng.) (Messrs. Merz and McLellan). Companion: Mr. C. R. King (chairman of the East Midlands Electricity Board).

The following have been elected as

**Mr. J. Eccles**

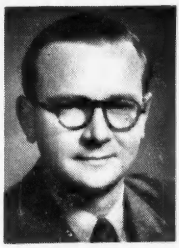
**Mr. T. E. Goldup**

**Mr. H. W. Grimmitt**

**Dr. C. Dannatt**

Mr. O. W. Humphreys

Mr. A. H. Mumford



Mr. G. Lyon

Mr. C. R. King

officers and as Committee members of the various Sections:—

*Measurements.*—Chairman, Mr. L. Hartshorn, D.Sc.; vice-chairman, Mr. M. Whitehead; members, Messrs. G. W. B. Mitchell, B.A., and R. H. Tizard, B.A.

*Radio.*—Chairman, Mr. E. C. S. Megaw, M.B.E., D.Sc.; vice-chairman, Mr. C. W. Oatley, M.A., M.Sc.; members of Committee, Messrs. N. R. Bligh, B.Sc.(Eng.), J. H. H. Merriman, M.Sc., A. R. A. Rendall, Ph.D., B.Sc., J. A. Saxton, Ph.D., B.Sc., and Brig. E. J. H. Moppett. The Committee has co-opted Mr. G. G. Macfarlane, B.Sc., to fill the casual vacancy created by the election of Mr. Oatley as vice-chairman before the completion of his term of office as an ordinary member.

*Supply.*—Chairman, Mr. C. M. Cock; vice-chairmen, Messrs. L. Drucquer and J. D. Peattie, B.Sc.; members of Committee, Messrs. B. Adkins, M.A., L. D. Anscombe, M.A., and J. S. Forrest, M.A., D.Sc. The Committee has co-opted Mr. G. N. Green to fill the casual vacancy created by the election of Mr. Drucquer as vice-chairman before the completion of his term of office as an ordinary member of the Committee.

*Utilization.*—Chairman, Mr. J. W. T. Walsh, O.B.E., M.A., D.Sc.; vice-chairman, Mr. J. I. Bernard, B.Sc.Tech.; members of Committee, Messrs. M. W. Humphrey Davies, M.Sc., D. B. Hogg, M.B.E., E. Mead, B.Sc.(Eng.), and G. V. Sadler.

## European Power

THE Committee on Electric Power of the United Nations Economic Commission for Europe has just devoted a two-day session to a general review of E.C.E. activities in the field of electric power and has directed the secretariat to carry out studies on certain specific subjects.

Representatives of the following countries attended: Austria, Belgium, Finland, France (also representing the zones of occupation in Western Germany), Greece, Italy, Luxembourg, Netherlands, Sweden, Switzerland, Turkey, the United States of America and Yugoslavia. Mr. P. Smits (Belgium) and Mr. Etienne (Switzerland) were re-elected as chairman and vice-chairman, respectively.

The Committee expressed its appreciation of the study on "Transfers of Electric Power Across European Frontiers," prepared by the E.C.E. secretariat, and decided to publish a final edition for general distribution at the earliest possible moment. The secretariat has been specially instructed to undertake a study on possible exports from Yugoslavia. Other studies have been prepared by the secretariat on "Prospects Opened up by Technical Advances in Electric Power Production" and "Some Technical Aspects of the Transmission of Electric Power."

As the result of a note received from the International Institute for the Unification of Private Law, the Committee decided that a study should be undertaken on drawing up a standard form of contract for the international cession of electric power. This will be based on national reports on the subject received from the various countries. The legal obstacles to the hydro-electric development of successive rivers are to be reviewed and the Committee has also requested the secretariat, following a note from the Austrian delegation, to undertake a survey of back-pressure plants. With regard to rural electrification, the secretariat intimated that it had received national studies, based on the common plan, from eight countries. In addition, the Technical Assistance Administration of the United Nations has agreed in principle to appropriate funds from its 1952 budget to finance such a study.

# PARLIAMENTARY NEWS

*From Our Special Reporter*

ON the second reading of the North Wales Hydro-Electric Power Bill in the House of Lords, Lord Ogmore said that while he had no objection to the economy reasons for the project, they must be careful to see that beauty was preserved in one of the few regions left comparatively untouched. He urged the Government to look at the amenities clause (Clause 23) to see if it was strong enough for the purpose. Would it not be better if the B.E.A. had to obtain the approval of the planning authorities rather than just consulting them?

Lord Drogheda, the chairman of committees, said that while he could not speak for the promoters, the matter would be borne in mind.

The Bill was read a second time.

## Scottish Industry

During a debate in the House of Commons on industry in Scotland Mr. Henderson Stewart, Joint Under-Secretary for Scotland, referred to the importance of higher technology, and said that members would no doubt be interested to know what was happening at the Ferranti works. The first stage of the scheme mentioned in the White Paper had been reached whereby the company would act as a parent contractor to a number of small firms for research and development work on electronics.

Mr. W. S. Duthie said that in connection with the hydro-electric development in the north they had as a nation to take a leaf out of the book of Canada and the United States. Their industries had gone as near as possible to the source of supply as in the case of Niagara, Oregon, and the Tennessee Valley. In the glens of Scotland they had plenty of power and room for expansion. All they wanted was goodwill and forceful action.

Mr. James Stuart, Secretary of State for Scotland, said that the North of Scotland Hydro-Electric Board informed him that it had been approached by four firms for bulk supplies at a low rate for electro-metallurgical and electro-chemical processes. The price which the firms were prepared to pay was about one quarter to one half of the cost price of producing the electricity.

In reply to a question by Mr. MacPherson on the development of the electronics industry in Scotland, Mr. Sandys (Minister of Supply) said that a detailed scheme had been worked out for a new laboratory block to be erected adjacent to the premises of Ferranti, Ltd., in Edinburgh, at a total cost of £513,000. The provision of a new building and ancillary services to a value of £205,000 had been authorized and architects' drawings were being prepared. Machine tools to the value of £102,000 had been allocated to the company from the Ministry's stocks and some of them were already in use in their existing premises. Other equipment was on order. He understood that Ferranti, Ltd., was in communication with a number of firms who might be suitable associates and that the employees of one firm had already begun work in the Ferranti premises. Employees of other firms were expected to start there shortly and four firms were doing electronic work in their own premises on sub-contract.

## Cable Manufacture

Mr. Chetwynd asked the Minister of Supply what action he was taking to implement the recommendations of the report of the Monopolies and Restrictive Practices Commission on the supply of insulated electric wires and cables.

Mr. Low said that the Minister was in correspondence with the trade associations concerned and would make a statement after he had received and considered their observations and proposals on the report.

## Television Plans

Mr. Gammans said the B.B.C. informed him that the estimated western limits of effective range of the proposed television transmitter on North Hessary Tor, Dartmoor, would be approximately along a line running from Padstow to the Lizard. Satisfactory reception of television programmes might be possible in some areas beyond the estimated western limits but to what extent would not be known until tests had been made from the transmitter site. In accordance with the Government's decision, no work on this station would be done for the present, apart from acquiring a site.

Mr. Gammans said that a new television transmitter ordered by the B.B.C. would be erected at Alexandra Palace.

## Power and Heating Schemes

Mr. Nabarro asked the Minister of Fuel and Power whether, in view of his support for the principles of back-pressure generation in properly balanced domestic and/or industrial power and heating schemes, he would consult the Minister of Housing and Local Government with a view to promoting an experimental scheme in one of the new towns or in a district scheduled for rebuilding in one of the bombed towns.

Mr. Lloyd said that there was already one

scheme of this kind and he would certainly discuss with the Minister of Housing the possibility of promoting other schemes of a similar nature.

## Cancelled Orders

Mr. Osborne asked the President of the Board of Trade if he was aware that the South African Minister of Transport had cancelled orders in Britain and placed them elsewhere because of the long delays in delivery by British firms, including 40 electric units promised for early 1951, 15 electric motor coaches promised for November, 1950, and locomotive boilers ordered for early 1950, none of which had yet been delivered; and if he would make representations to the South African Government to see if these orders could not be retained in Great Britain if immediate delivery of the equipment could be guaranteed.

Mr. Peter Thorneycroft said he was aware of the statement of the South African Minister about delays experienced in receiving equipment ordered by the South African Railways from the United Kingdom, but he was not aware that the orders referred to in the question had been cancelled.

## New Tariffs

Mr. Vaughan-Morgan asked the Minister of Fuel and Power what representations he had received from Consultative Councils with regard to inequities in the application of the new electricity tariffs; and what defects he had notified to the Central Authority as a result of these representations.

Mr. Geoffrey Lloyd said the answer was "none."

## Generating Capacity

Mr. Nabarro asked the Minister of Fuel and Power what was the estimated deficit, expressed as a percentage of maximum generating capacity, at peak hours during the period November, 1952, to February, 1953, of anticipated maximum generating capacity of the British Electricity Authority power houses compared with anticipated maximum demand, excluding private generators, in respect of an average cold winter's day and also a very cold spell.

Mr. Lloyd said that the estimates, which were inevitably tentative, were: for a cold spell about 12 per cent and for severe weather about 18 per cent of the probable available capacity.

Asked whether he was reasonably satisfied that the load spreading in the forthcoming winter would be sufficient to meet all foreseeable contingencies, Mr. Lloyd said it would be unwise to be complacent in the matter, but he believed the committee had struck a fair balance between economy and avoiding putting too much inconvenience upon industry and the workers.

# IN THE COURTS

### *Extension of Contract Time*

ON 1st July the Court of Appeal affirmed Mr. Justice Gorman's decision, given on 12th March, in the case of *Amalgamated Building Contractors, Ltd.* v. *Waltham Holy Cross U.D.C.*, concerning the interpretation of clause 18 of the Royal Institute of British Architects' standard form of contract.

The facts were that in June, 1948, a formal contract was entered into for the building of a number of houses, to be completed by 7th February, 1949. In January, 1949, the builders gave notice to the architect that "in view of labour and material difficulties" they would be unable to complete to time, and asked for a 12 months' extension; this was refused. Practical completion was effected on 28th August, 1950, and on 20th December following the architect certified that the work should have been completed by 23rd May, 1949, and granted the appropriate extension on the same date.

The builders sued for £3,293, certified as due to them, and the Council, while admitting the claim, counter-claimed under clause 17 of the contract for liquidated damages, fixed at £50 per week, for failure to complete in time. The Council averred that the damages were payable as from the original completion date, as the architect had acted outside the terms of the contract, not only in granting a retrospective extension, but in doing so after practical completion. Mr. Justice Gorman, holding that the architect had acted within his powers, allowed the claim and counter-claim, the latter to date from 23rd May, 1949. On balance, therefore, the builders were indebted to the Council in £57. The Council appealed against this decision.

Lord Justice Denning said that the question turned on the true construction of clause 18 of the R.I.B.A. form, the operative words being —"If in the opinion of the architect the works be delayed, then in any such case the architect shall make a fair and reasonable extension of time for completion of the works." Eight possible causes for delay were printed in the clause, and a ninth—"by reason of labour and materials not being available as required"—was inserted in typescript.

While nothing in the wording indicated whether an extension could be granted retrospectively, "time for completion" did not necessarily connote a looking forward. Non-availability of labour and materials could create a continuing delay, as could inclement weather, and it might not be possible to assess the extent of such delay until after completion. He held that the learned Judge's decision was right, and the appeal would be dismissed.

# CORRESPONDENCE

*Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.*

## Anglo-French Grid Link

I AM glad to note that at long last the possibility of the interconnection of the British and French grids has been mentioned in a debate in the House on 7th July by the Minister of Fuel and Power. The joint committee of the B.E.A. and Electricité de France has apparently concluded that it should be technically possible to couple the systems, although some experimental work will first be necessary.

Surely the art of electric power transmission has progressed sufficiently in the past 50 years in both countries for such a project to be beyond the experimental stage? I would suggest that the matter has now become an urgent one, affecting the economics of electricity supply in S.E. England and Northern France.

In a lecture I gave at Grantham on the British grid system on 15th November, 1932, before the members of several engineering societies, I concluded with the suggestion that one day the British grid would be coupled with that of the Continent by submarine cable as there were no insuperable engineering difficulties in the way. This view was reiterated in an informal lecture on the grid which I gave before the Junior Institution of Engineers in London on 5th February, 1937, and was dealt with in the subsequent discussion.

France, unlike Britain, has not been endowed by nature with ample coal measures, and consequently is developing with all possible speed her hydro-electric resources as a means towards an economic fuel and power policy as well as the prime necessity of meeting the national maximum demand.

Electricité de France will probably catch up with her peak load this coming winter, but despite the efforts which are being made here it seems unlikely that we shall be in a similar position for the next three years.

While one naturally desires independence in power supplies, I suggest that the urgency and the economics of cross-channel exchange of load at the dissimilar peak periods obtaining, cannot be neglected in these days of financial stringency and the necessity of framing a national fuel and power policy.

It is to be hoped that there will be no "sitting" on the report and that we shall proceed at once with such a scheme, which I am convinced is long overdue and which will be both a financial and technical success.

*Isle of Bute.* L. M. JOCKEL,
M.I.MECH.E., M.I.E.E., F.INST.F.

## Switch Positions

MR. T. L. FRANKLIN'S suggestion for changing the accepted position for lighting switches (27th June) does not pursue the matter to its logical conclusion.

It should normally be possible to control a light from the room in which it is situated. This facility can easily be arranged, while at the same time avoiding the unsightly marks on the wall around the switch plate that are caused by fumbling for the switch. The answer is to mount the switch on, or butt it up to, the architrave at the same height as the door handle, where it can be operated with certainty. An extra refinement, if finances allow, is to use two-way switching with the extra switch fixed in a similar position outside the room.

*Jersey, C.I.* W. K. ALLEN,
M.ENG., A.M.I.E.E., A.M.I.MECH.E.

## Light Gauge Conduit

I HAVE read Mr. A. V. Leighton's eulogy of light gauge conduit with interest and think that most of his points would be endorsed by practical installation engineers with the exception of his claim that a good earth continuity conductor is ensured with this material. It would be very interesting to know the method of testing employed whereby sustained resistances as low as 0·02 ohm can be visualized, as it is well known that resistances apparently vary with the magnitude of the testing current.

If he has not already read it, I would recommend Mr. Leighton's attention to the recent E.R.A. report V/T109 entitled

"The Incidence and Avoidance of High Resistance Joints in Steel Conduit Runs in Service," which states that grip conduit is more likely to develop high-resistance joints. I would also mention the following recommendation in the report:—

> "The permissible limit to the resistance of the earth continuity conductor should be reduced to 0·1 ohm for newly installed conduit systems except for runs known to exceed 100ft in length. It should be specified that continuity tests be made at a range of currents, and undue variation in the values of apparent resistance so measured should be held to denote non-compliance with the Regulations."

Possibly after making heavy-current tests on light gauge conduits Mr. Leighton would be inclined to modify his views as to adequacy as an earth continuity conductor in an installation with, say, main fuses rated at 60 A.

*Folkestone.* T. C. GILBERT, M.I.E.E.

## Ring Mains

THE subject of ring main wiring having again become prominent in these columns, may I point out some limitations imposed by the current I.E.E. Regulations which do not appear to have any logical basis?

(1) Some jobs (particularly where existing property is being wired) do not lend themselves to ring main methods, but despite this would benefit from the use of ring main type socket outlets. In my opinion there can be no objection to an unlimited number of final sub-circuits being brought into a 30 A fuse way providing that they are 7/·029in, feeding either not more than two outlets in different rooms or an unlimited number of outlets in one room; or 7/·036in feeding up to six outlets.

(2) Fixed appliances are limited to 15 A on a ring main. What if one desires to utilize a separate ring for fixed appliances only as in the case of panel fires or convectors? Again, where fixed room heating appliances are connected by way of socket outlets to a common ring, surely allowances should be made for the change of load position in that room to avoid the ridiculous situation existing at present wherein any number of portable fires can be utilized, but should one screw them to the wall one is then limited to 15 A connected load.

(3) Is there any reason why a spur off a ring may be regarded as being adequately protected by a 30 A fuse, while the same cable, if a final sub-circuit, must have a fuse of not more than 20 A? The latter size, incidentally, is almost unobtainable.

Reasoned objections to amendments to the I.E.E. Rules to admit of the methods outlined above would be welcomed by me.

JOHN TRAPP (ELECTRICAL), LTD.,
*London, N.8.* B. RAYNOR, *Director.*

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# Electronic Telephone Equipment

DURING recent years there have been rapid advances in the development of electronic techniques and in their application to a wide variety of purposes such as the construction of computers. Post Office engineers at the Dollis Hill research station have been studying the application of these techniques to automatic telephone exchanges. Their aim is to provide telephone exchanges operated entirely by electronic means instead of by the present type of electro-mechanical switch. The electronic apparatus has no moving parts, it is almost instantaneous in operation, and may eventually prove cheaper to install and maintain than our present-day exchanges.

Six electronic directors have been constructed in the Post Office laboratories and have recently been brought into service at Richmond telephone exchange in London. The director is that part of the exchange equipment which in large cities such as London respond, to the three letters dialled by the subscriber and steers his call to the wanted exchange. A single director does this for about half a million calls a year: with the present type of electro-mechanical director the operation is somewhat noisy and there is a good deal of mechanical wear brought about by the hard usage. The electronic director has no moving parts and does its work silently.

Although the installation at Richmond is experimental it is noteworthy as it is believed to be the first instance of the use of a fully electronic item of switching equipment in a public telephone system in the world. There are many research problems and practical difficulties still to be overcome and it will be some years before the new idea can be developed as a complete system for installation in our exchanges.

Modern starting equipment in the finishing and final inspection department

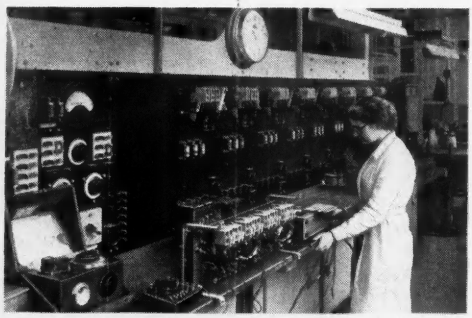
# Switchgear Production

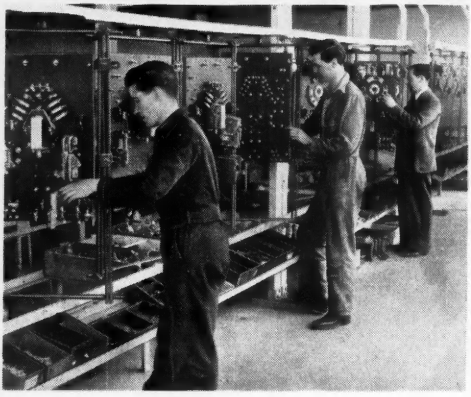
## *Improved Output and Development Facilities*

ADDITIONAL space for assembly, testing, storage and despatch, as well as greatly improved facilities for development and research, results from the recent opening by Brookhirst Switchgear, Ltd., of its new Jubilee building. Adjoining the original Northgate Works at Chester, this extension has a floor area of 45,000 sq ft arranged on three floors, the top one being used for assembly, the first floor for a canteen and games room, and the ground floor as an addition to the final assembly, inspection, test, research, development, warehouse and packing departments. Simultaneously with the erection of the extensions the opportunity was taken to improve the entrance to the factory with the provision of an attractive courtyard.

The new assembly department on the top floor not only manufactures components but also finished units of standard types. Here may be clearly seen the company's practice of making up the units from standard components, the units in turn being built up into larger assemblies if required. The "Unibord" multi-motor control board (for motors up to 200 h.p.), for instance, is constructed entirely from standard angle-iron framework which accommodates standard busbar chambers

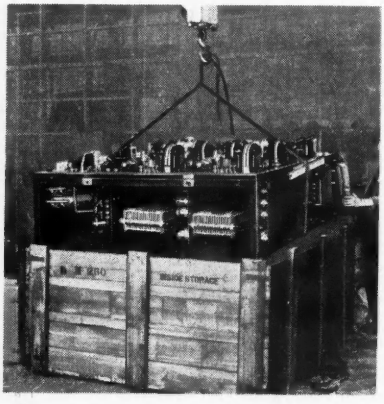
*Left:* **"Isofuses" in course of assembly.** *Right:* **Assembling a motor control panel**





*Above:* **A corner of the development section and rotatable panel mounting racks**

**Part of an open type d.c. marine control panel for the liner *Obuasi* being loaded into its packing case**



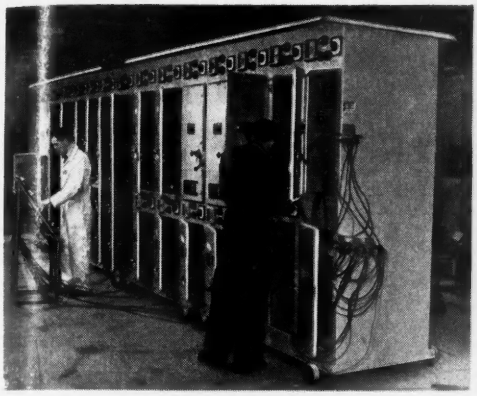
and standard enclosures. This flexibility of design enables almost all requirements, even special ones, to be covered using standard assemblies. It also has the advantage of permitting quite complicated schemes to be undertaken by unskilled labour, of facilitating alterations, and of allowing assembly on site, a feature of special value for export.

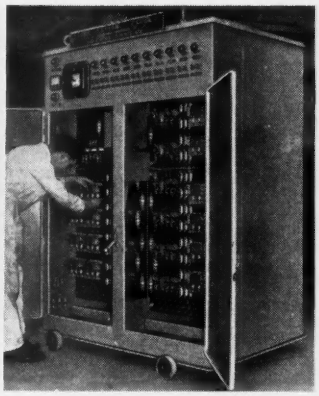
Among the many interesting items we had pointed out to us when we visited this department were snap-action switches, fractional h.p. motor starters equipped with overload protection, forward and reverse machine tool switches, cam-operated loom control reversing switches, rheostatic type variable speed d.c. starters, and "Isofuses." The last-named are separately fused isolators, particularly useful either as individual units or incorporated in other gear, for machine tools, etc. In the making up of the switch panels a novel suspension device is employed for holding the equipment so as to give ready access to all parts.

From the top floor the components or complete units are taken to a warehouse on the ground floor, whence they are issued for packing or for incorporation in other equipment, any modifications required to meet customers' special requirements being undertaken in an adjoining department. With appropriate coils and resistances incorporated, all units receive a final test and inspection before despatch.

Apart from the large quantities of standard equipment passing through the final assembly and test departments, many special contracts were in course of completion during our visit. Noteworthy was a 27ft long switchboard for the power station auxiliaries at the Congella generating station, South Africa, which comprise the induced and forced draught fans, the milling plant for the pulverized fuel, and oil lighting equipment for starting up the boilers. The company is acting as sub-contractors to Babcock & Wilcox, Ltd. This board has had to be made to fit into a limited space, is fully "tropicalized" to meet conditions of high humidity, and is provided with full sequence interlocking to permit safe operation by native labour.

Also nearing completion was one of three units being supplied to G.W.B. Electric Furnaces, Ltd., for installation in the I.C.I. brass and copper strip plant at the Kynoch Works, Birmingham. This particular board is for the automatic





*Left:* **Testing a switchboard for controlling auxiliaries at the Congella power station, South Africa**
*Right:* **Fan motor sequence control panel for the I.C.I. brass and copper strip plant at Birmingham**

control of twenty fan motors. A similar panel controlling the heating has already been supplied, and there is a further order in hand for a control panel for a walking beam furnace. Wide use is made of sequence interlocking and great care has been taken to provide good access for maintenance purposes.

A high proportion of the company's output is destined to go abroad. One item of equipment we noticed in the final inspection department was a fully automatic voltage regulator for Canada. The company has also specialized in marine equipment for thirty years, making a wide range of control gear for engine room auxiliaries, steering gear and ventilation plant for British and overseas shipping. We were in time to see one of the open type d.c. panels for controlling the engine room auxiliaries on the new Elder Dempster liner *Obuasi* being loaded into its crate preparatory to despatch to Harland & Wolff, Ltd., Belfast.

The additional accommodation will greatly increase the scope of the development department, which now has improved equipment for making prototypes and for endurance tests on them, as well as other full test facilities, including film projection and oscillograph rooms. Type testing is carried out on the test board which has eight separate branch circuits.

The extensions now completed mark a further stage in a long-term scheme under which all stores will eventually be situated at the centre of the works buildings.

## Electric Water Pumps

THE second in the series of E.D.A. Farm Electrification Handbooks, " Electric Water Pumps " has now been published. In handy pocket size, and illustrated, its 72 pages describe the various types of electric pumping equipment available and consider their suitability for different purposes. There are eight main sections entitled respectively, sources of water, types of water pumps, electric motors, mechanical considerations, electric water pumps, choosing the right pump, installation and maintenance, and methods of control.

An important point brought out is that the immediate and most noticeable effect of an abundant water supply is the saving of labour. Not only is water-carrying a thing of the past, but many other operations are made easier and quicker. If only two man-hours per day are saved on all these operations on an average farm, it means that labour to the value of about £1 10s a week can be put to more productive use.

Copies of the publication can be obtained from Electricity Boards or from the British Electrical Development Association, 2, Savoy Hill, London, W.C.2.

# TRANSPORT COMMISSION'S REPORT

## *Electrification Developments During* 1951

DESPITE the financial control on expenditure exercised by the Government, considerable electrification development is revealed in the annual report of the British Transport Commission for 1951 (H.M. Stationery Office, 5s). On the railways, work on the Manchester–Sheffield–Wath electrification scheme continued. Twenty-seven locomotives were completed by the end of the year and ten more were almost finished. This scheme is the first in this country to incorporate regenerative electric braking.

The Commission approved the preparation of detailed plans and estimates for the electrification of the London, Tilbury and Southend line and gave authority for some preliminary projects to be carried out.

The second of the three Southern Region 1,600 h.p. main line diesel electric locomotives was completed in 1951 and the London Midland Region 1,600 h.p. main line units and 827 h.p. mixed traffic diesel electric locomotive did good service, mostly in freight traffic. Nineteen 350 h.p. diesel electric shunting locomotives were completed for the London Midland and Southern Regions.

The 2,500 h.p. gas turbine electric locomotive manufactured by Brown Boveri was operated mainly on passenger and milk services on the Paddington–Bristol route and during 1951 completed 41,000 miles. The second gas turbine unit, of 3,000 h.p., was completed by the Metropolitan-Vickers Electrical Co. and delivered for trials to the Western Region during December.

### New Southern Region Stock

In the Southern Region delivery of electric traction equipment for new and converted multiple-unit electric stock was again adequate, and ninety-two and forty-six trailer coaches were equipped during the year. The first train unit with a new and improved design of electrical equipment was completed during November and reductions in running and maintenance costs are expected. All electric traction equipment for new and converted rolling stock for the Southern Region will in future be of this improved design. Work, which will take several years to complete, was begun on a new distribution system, drawing its power at five principal points direct from the national grid. Advantage will be taken of the improved technical performance and greater load carrying capacity of modern oil filled cable to interconnect 72 rectifier substations of modern type with the feeding points. These substations will be remotely operated from the central control stations at Lewisham, Norwood and Raynes Park. Intermediate track paralleling huts will be installed to increase reliability of operation and to improve performance.

A start was made on development work to reduce capital and maintenance costs and increase efficiency. Experiments were begun on the design and lubrication of pantographs and on schemes for quickening the response for supervisory control systems. Amongst measures taken to reduce the cost of structures for overhead conductor systems was a simplified means of bringing conductors through bridges without rebuilding. An experimental installation to test designs intended to prolong the life of conductor equipment in the smoky atmosphere of tunnels is being provided.

Among other important projects in hand at the end of the year was the colour light signalling at Newcastle Central. Work on colour light signalling between York and Darlington and on the mechanization of Toton up marshalling yard was completed during the year.

### Long-Term Plans

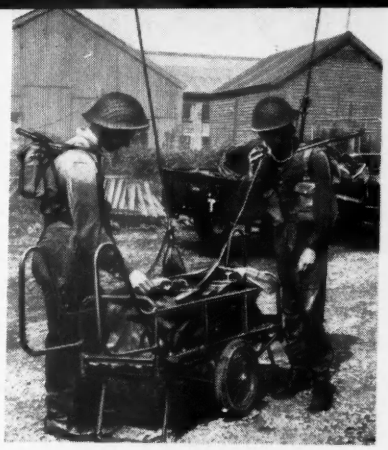
The London Plan Committee continued to give consideration to long-term proposals for railway improvements in London. The Commission gives first priority to route "C" which would link by underground railway the Tottenham and Walthamstow districts with the West End and provide a new connection between Victoria, Oxford Circus and Kings Cross. The Southern end would be projected over the Wimbledon District Line branch. The views of the Government on this scheme are awaited.

The Glasgow Passenger Transport Committee recommends the electrification of the railway suburban lines and proposes that Buchanan Street and Queen Street (high level) stations should be amalgamated.

Consideration is being given to the modernization of the London Transport Executive's power supply system, parts of which are over forty years old, and the first stages in modernization of the distribution system were put in hand. Work on one substation was begun in the late summer of last year and contracts were placed for work at two other substations where the frequency is to be changed from 33⅓ to 50 c/s. The four boilers at Neasden generating station which formerly burnt heavy fuel oil were modified to burn creosote pitch. All boilers at Greenwich were altered to improve their efficiency in the use of low-quality coal with consequent economies. New plant was put into use early in the year at Lots Road to improve grit extraction from flue gases.

# Signals Research Station

## *Equipment for the Fighting Services*



A FEW days ago we visited the Signals Research and Development Establishment of the Ministry of Supply in Hampshire where research on, and the development of, communications equipment for the fighting services is carried out. Essentially the work here is conducted in four divisions—research, development, engineering and technical services.

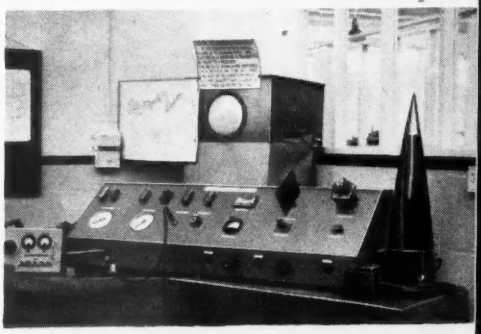
It is frequently necessary to observe and record a number of physical quantities, such as pressures, temperatures, accelerations, positions, etc., and it is sometimes preferable to signal them to a distance where they may be observed and recorded at a fixed point. In the Research Division we saw a demonstration model produced by the telemetry group whereby up to 23 quantities are electrically sampled and transmitted by radio to a receiver. The received signals are displayed on a cathode ray tube but they can also be recorded on paper; any one quantity may change up to 40 times a second.

The lines group in the Development Division is concerned with the development of the lines themselves and the telephone and telegraph equipment utilizing these lines. The objective is to develop wire and cable with improved transmission characteristics for a given size and weight and to devise faster methods of laying cable or erecting overhead lines. Five new types of cable and three new types of pole route are being developed.

The line circuits not only involve a great deal of effort to provide and maintain, but amount to a large proportion of the volume and weight of signals stores to be transported, hence it is vital that the line circuits are used as efficiently as possible. New telephone switchboards, signalling units, carrier telephone equipment, audio repeaters, carrier telegraph equipment and machine telegraph instruments are all under development with this object in view.

Under modern battle conditions urgent but precise speech communication is vital, even when the ambient acoustical and electrical noise levels are abnormally high. The electro-acoustics group investigates the acoustic problems associated with Army communications and tries to ensure that the wireless and line equipment developed by S.R.D.E. is equipped with suitable types of microphones, telephone receivers and loudspeakers, new models being developed where suitable types did not already exist. An exhaustive study is being made of speech communication in high ambient noise, work being carried out both in the field, on armoured fighting vehicles and under controlled laboratory conditions.

**Demonstration of telemetry equipment in the Research Division**



The radio group is at present occupied with the design of a new range of signals and regimental wireless sets. The signals equipment consists of multi-channel microwave and v.h.f. sets to be used by the Royal Corps of Signals in rear and intermediate areas. Regimental sets are used in forward areas and with the exception of long range vehicular sets which are amplitude modulated and work on h.f. they operate in the v.h.f. band and employ frequency modulation. Improved performance has been achieved and many of the disadvantages of the existing range have been avoided. As a result the operation of the sets has been simplified and training time for operators reduced. This has increased the complexity of the sets but precautions have been taken to ensure that maintenance is not unduly complicated.

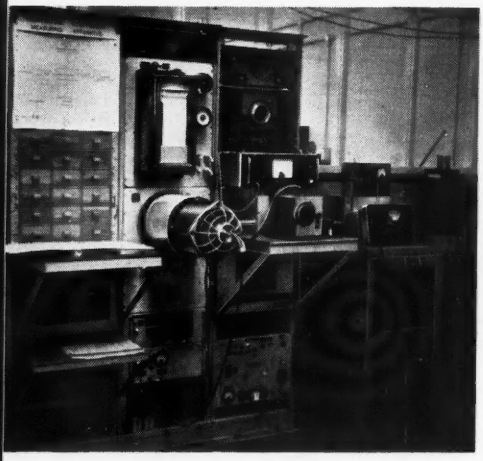
The Engineering Division is concerned with the waterproofing of vehicles and equipment, the mechanical design of aerial masts, pan-climatic packaging and the production of prototypes under development in the other laboratories.

The stability and physical size of electronic equipment depend to a large extent on the properties and dimensions of the components employed. The present trends in equipment design toward "miniaturization," tropic-proofing and general improvements in performance would not be possible without the greatly improved components which are being developed in the Technical Services Division. A considerable reduction in the size of most components has been achieved since the war and this is clearly shown in the case of electromagnetic relays. Improvement in tropical performance has resulted from the application of new and improved materials and, where desirable, by means of sealing or canning techniques. In view of the wide temperature range over which Service equipment has to operate (— 40 to + 55 deg C) the problem of frequency drift in oscillator circuits, due to the variation in capacitance and inductance with temperature, has become acute. The main objectives of the Division are the development of capacitors and inductors having low temperature coefficients and the development of capacitors of known temperature coefficient to compensate the inherent coefficient in the other elements of the circuit.

Communication equipment used by the Army must be capable of withstanding very severe conditions, both mechanical and climatic. For climatic tests, chambers are available for temperatures from — 60 deg to + 70 deg C, damp heat to simulate tropical conditions, low pressure to simulate aircraft flying at altitudes up to 60,000ft, combined with low temperatures if required, artificial rain and dust storms. For durability tests a bumping machine to simulate transport in a vehicle travelling over rough ground, various vibration machines and a drop test for packages are available. The vibration test consists of subjecting the equipment to vibration at all frequencies from 10 to 150 c/s. This test is always carried out during the early stages of development of the equipment and enables any weaknesses in this respect to be corrected before the design has proceeded too far.

It is also necessary to ensure that all the materials and finishes used in the construction of Army equipments will withstand the tests applied to the complete equipment, and the Division carries out the mechanical and electrical testing involved.

**Temperature coefficient measuring apparatus is used in the development of new components**



## "Nalgo" Change of Name

The National Association of Local Government Officers has changed its name to National and Local Government Officers Association. The short title "Nalgo" will still be used.

# The Building Centre

## *Electrical Section Opened*

MANY well-known electrical men and architectural representatives attended the opening of the Electrical Section of the Building Centre on Thursday last week at the Centre's new quarters in Store Street, Tottenham Court Road, London, W. The ceremony was informal, but brief speeches were made by Dr. P. Dunsheath, president of the British Electrical Development Association, Mr. H. T. Young, chairman of the E.D.A. Building Centre Committee, and Sir Alfred Hurst, chairman of the Building Centre.

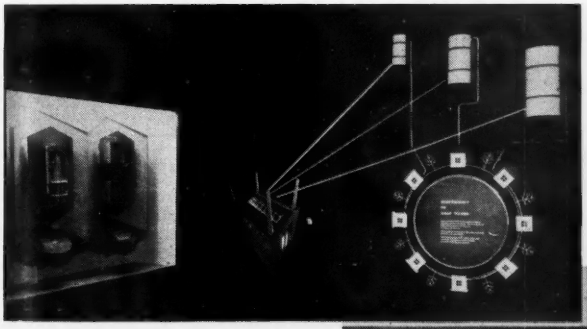
Mr. Young, in opening the proceedings, referred to the early days of the Centre and to the important part which the electrical industry had played in its establishment. He hoped that architects would make the fullest use of the Electrical Section and seek information, particularly in the early stages of building construction. He congratulated Mr. Hulme Chadwick on the architectural design of the display and Mr. V. W. Dale, general manager and secretary of E.D.A., and his staff on their work in organizing the exhibition.

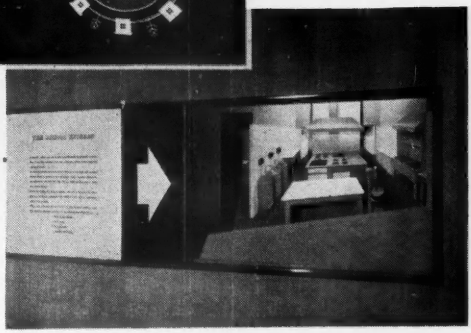
Sir Alfred Hurst referred to the difficulties which E.D.A. had had to face in the post-war years in carrying out its function—the encouragement of the use of electricity—and congratulated it on keeping its machinery efficient in difficult conditions.

Dr. Dunsheath spoke of his interest in the educational work of E.D.A. and emphasized the educational value of the Electrical Section, particularly for students.

The primary aim of the Electrical Section is to attract members of the architectural profession and the building industry, and the display emphasizes the need for incorporating electrical services in the design of new buildings.

In the first room intake methods are illustrated, together with different circuits and types of wiring. Plans show the wiring of a domestic installation in four circuits for lighting, cooking, water heating and plug points. "Outsize" models of standard plugs with cartridge fuses and socket outlets are also displayed. A raised platform and canopy show underfloor ducts and industrial overhead wiring systems.





**Two of the displays in the Electrical Section of the Building Centre, showing** *(above)* **the water heater display and** *(right)* **the model school kitchen**

Left to right: Mr. [illegible] R. Yerbury, Director, Building Centre Council, Mr. [illegible] Chadwick, Sir Alfred [illegible]urst, K.B.E., C.B., Dr. P. [illegible]unsheath, Mr. V. W. Dale and Mr. H. T. Young

Dr. P. Dunsheath with Professor R. O. Kapp inspecting one of the displays

Water heating systems are illustrated by a model power station from which electricity (indicated by low-voltage neon tubes) is sent to three water heaters and from these the hot water bubbles down the pipes to a number of flueless houses. Models of single-point heaters and immersion heaters are also included in the display.

Illuminated diagrams of domestic and school kitchens and a cafeteria are shown in the second room. Plans and lists of equipment required for the 250- and 500-meals kitchens are exhibited, and plans are displayed for a cafeteria counter capable of supplying 150 meals in 10 to 15 minutes. Information on space heating defines the purposes for which different appliances are particularly suitable.

The section dealing with lighting displays the wide variety of filament, discharge and tubular fluorescent lamps, and revolving sequences of illuminated colour transparencies show lighting schemes applied to various types of interior. Any of these interiors can be stopped by a push-button control. A back-lit coloured photograph, nearly 20ft long, shows Thames-side as seen from the new South Bank power station.

A reference room contains a comprehensive range of data sheets, manufacturers' catalogues, and the latest E.D.A. publications. Some of the latest domestic appliances will be shown in this room for limited periods.

## Transport in Wolverhampton

THE report of the Wolverhampton Corporation Transport Department (general manager, Mr. R. H. Addlesee) for 1951–52 shows that the trolley-buses earned a gross surplus of £114,912 and the motor-buses £3,535. After meeting loan charges, however, there was a net deficit of £18,853. It is stated that a second fares increase was brought into force last January, but month by month the cost of providing the services has continued to rise.

From statistics in the report it is seen that the trolley-buses carried 77·2 million passengers and the motor-buses 37 million. Trolley-bus revenue per vehicle-mile, including advertising, etc., averaged 26·487d and working expenses 21·784d, while in the case of motor-buses the figures were respectively 22·013d and 21·82[illegible]d. Electricity used for traction totalled [illegible]·2 million kWh, equal to 2·429 kWh per mile. Average ordinary fares per mile were 1·3[illegible]d (trolley-buses) and 1·342d (motor-buses).

# Commerce and Industry

## *Kent County Show*

## *Equipment for Arctic Expedition*

BY far the largest and most impressive "trade" display at last week's Kent County Show, at Maidstone, was that of the South Eastern Electricity Board. This extensive marquee with a timbered front was the one used at the recent Guildford Show. The interior was divided into sections to represent various phases of farming and rural industry—dairying, grain drying, poultry rearing, pig breeding, soil warming, pumping, etc. Interesting examples of welding of farming equipment and other workshop methods were exemplified. Although the main emphasis was placed on the business side of farming there was also a good display of domestic equipment. We were informed that many promising inquiries were received during the two days of the show.

Another excellent display was that of Drake & Fletcher, Ltd., Maidstone electrical contractors. It included motors, pumps and large refrigeration equipment as well as a selection of domestic appliances. Here, too, we learned that good business prospects had resulted.

Several stands included examples of electric soil warming equipment, small generating sets, motor driven pumps, electric fencing, etc. Refrigerators were shown by a number of exhibitors, including the Pressed Steel Co., Ltd., the Hartford Electric Co., the Southern Counties Refrigeration Services, Ltd., and D. P. Toomey & Co., Ltd.

### Copper Prices

The Ministry of Materials announces that it has completed arrangements with its Commonwealth suppliers for the continuation of the present copper price throughout the month of July. The Ministry's selling price of £287 per ton can therefore be regarded as stable at least until the end of the month.

From 11th July the Ministry's buying price for rough copper in slabs of from 2 to 3 cwt has been raised from £230 to £235 per ton.

### Plant for South Africa

The Electricity Supply Commission of South Africa has placed with the General Electric Co., Ltd., a contract for a 60 MW, 11·8 kV turbo-alternator. This will be installed 5,100ft above sea level at Wilge power station. The order raises to thirteen the number of sets of this rating that the G.E.C. now has in hand. The turbines are being made at the Fraser & Chalmers Engineering Works, and the alternators at the Witton Engineering Works, of the G.E.C.

### E.A.W. Annual Conference

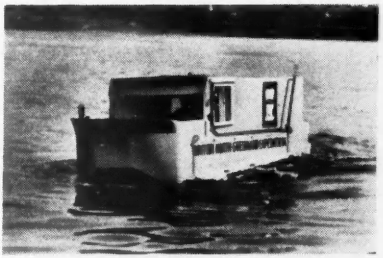
The annual conference of the Electrical Association for Women will take place on 15th April, 1953. The annual general meeting and luncheon will be held at the Connaught Rooms, Great Queen Street, W.C.2.

### British North Greenland Expedition

Among the large quantities of equipment being shipped to the Arctic by the British North Greenland Expedition in the s.s. *Tottan* is a consignment of 20 Exide 6 V starter batteries supplied by Chloride Batteries, Ltd. These are to be used for various duties on the Expedition's eight "Weasel" track type amphibious vehicles. Led by Commander C. J. W. Simpson, D.S.C., R.N., the party of fourteen scientists and twelve serving officers is to undertake a varied programme of research and equipment testing. Valuable data is expected to be forthcoming on the performance of the batteries in the extreme cold and under the arduous conditions that will be encountered. Each battery was supplied in a dry charged condition.

The members of the British North Greenland Expedition face the prospect of winters when, for two months, there is only darkness. They will live and work in a base hut which they will erect in Greenland. The lighting and power installations are, under such circumstances, of vital importance and provision has been made for two separate lighting supplies and for three

**One of the "Weasel" track type amphibious vehicles which will be used by the British North Greenland Expedition**



power supplies. In support of this large-scale expedition the G.E.C. has contributed all electrical fittings and " Osram " silverlight and clear lamps. Part will be dropped by parachute.

The Expedition has taken four new-type high frequency transmitter-receivers for intercommunication when the group is working as separate units. The wireless equipment will be fitted to sledges. Power (about 2 W) is generated by a hand crank. Two " spot " frequencies on the 2·5–8·5 Mc/s band can be used in operation, and a single transmitter/receiver dipole is fitted as an aerial. The equipment has been designed and manufactured by Marconi's Wireless Telegraph Co., Ltd., and has been loaned to the expedition.

## Tungsten Ore Price Reduction

The Ministry of Materials announces that with effect from 12th July, its selling price for tungsten ore of standard 65 per cent grade and ordinary quality has been further reduced from 467s 6d to 447s 6d per long ton unit delivered consumers' works based on the current buying price of 425s per long ton unit c.i.f.

## Aluminium Scrap Price Increase

The Minister of Supply has made the Aluminium Scrap Prices (No. 2) Order, 1952 (S.I. 1952 No. 1300) increasing the maximum prices of aluminium scrap from 14th July. This follows the increased price of virgin aluminium which came into effect on 1st July.

## Fatal Shock from 11 kV Line

An employee of the Eastern Electricity Board, Robert Edward Flatt (53), was killed when he came in contact with an 11 kV overhead line. At the inquest at Stansted evidence was given by a fitter's mate that deceased had failed to comply with regulations by not carrying out a test to ensure that the line was " dead." The mate said he had worked with other fitters who had not, in similar circumstances, carried out the test, and the coroner expressed the hope that the authorities would tighten up the supervision of the regulations and see that they were adhered to. A verdict of " Accidental death " was recorded.

## Diesel Generator Export Order

It is announced by the English Electric Co., Ltd., that an order has recently been placed with its Melbourne branch by the Commonwealth of Australia, Department of Works and Housing, for the supply of diesel generating plant with an aggregate output of over 15,000 b.h.p. These S.V. and S.R.K. engines, together with English Electric alternators and various station accessories, are to provide power for factories in New South Wales and Victoria.

## Electricity in the Home

Damage to person and property is often caused by misuse of electrical appliances in the home, faulty wiring and defective connections. With a view to preventing such accidents, the Fire Protection Association has issued a booklet which explains, in simple language, how an electrical installation works. Hints are given on how to deal with minor faults, but in more serious cases the general advice is " consult a qualified electrician." Some important " don'ts " are given. The booklet is published by the Association at 84, Queen Street, London, E.C.4.

## Doncaster Pumping Station

The accurate balance of a large L.D.C. motor was demonstrated recently before a number of people at the official opening of the latest extension of the Doncaster water works scheme. A penny was balanced on its edge on the top of the slipring cover of one of the two motors and although the motor was started up from rest, run up to full speed and full load, and stopped again, the penny was undisturbed. The silence of operation was also demonstrated, when it was found that from a distance of 50ft it was not possible to tell, by ear, whether the machines were running.

**Mr. Anthony Barber, M.P., watching a penny balanced on the motor after he had officially opened the new Doncaster pumping station**

[*Yorkshire Evening News photograph*]

Rossington Bridge pumping station, where these two motors are installed, is part of a £500,000 scheme for reorganizing and improving the water undertaking of the Doncaster Corporation. Each of the 200 h.p., 970 r.p.m. Lancashire-Crypto continuously rated motors drives a Sulzer Bros. pump capable of delivering 65,000 gall per hour against a total head of 440ft.

## Works Visits

A party of thirty-five students, under the leadership of Mr. Terry, the senior lecturer in machine design, from Faraday House, London, visited the Wolverhampton works of the Electric Construction Co., Ltd., on 26th June. The students were particularly interested in mercury-arc rectifiers, d.c. machines and also the power equipment and operation of the Automatic Telephone & Electric Co.'s "Rythmatic" control schemes. The party toured part of the works in the morning, taking lunch at Castlecroft Hotel, and completed the tour in the afternoon. Before leaving, they were entertained to tea in the staff canteen. Mr. J. Turner proposed a vote of thanks to the company and particularly thanked Mr. W. M. B. Furniss, assistant managing director, for the facilities afforded to the students. Mr. Furniss replied.

During last week parties of forty to fifty young men from the Hammersmith School of Building, Apprentices Section, visited the works of S. N. Bridges & Co., Ltd., in order to see and handle the portable electric tools of their trade made by the company. The students were shown how simply the electric tools worked. Following instruction by Mr. G. N. Bridges, a discussion was held during which criticisms were dealt with. Afterwards the students were taken through the workshops to see the electric motors being wound and the component parts being made and assembled.

## Factory Act Summons

At Rugby on 1st July the British Thomson-Houston Co., Ltd., was summoned for an alleged contravention of the Factories Act, 1937, in that the intake of a conveyor band and drum was not securely fenced and that in consequence an employee suffered injury. The employee was himself summoned by the company which contended that the contravention and injury were due to his own act or default. It was stated that the employee, Mr. F. W. J. Thompson, who had the job of keeping the conveyor clean, had previously had his fingers nipped. The accident was brought to the notice of the Joint Production Committee and instructions were given to the foreman to tell him to clean the conveyor when it was stationary. Mr. J. Entwistle, factory inspector, said that to his personal knowledge the B.T.H. Co. tried very hard to comply with the Act and he understood that this was the first time the company had been before the Court.

Announcing a fine of £20 and £10 10s costs, the chairman said that the magistrates realized that the company was always most careful in taking all possible precautions in the interests of the employees and in view of its very good record the penalty was somewhat light. The summons against Mr. Thompson was dismissed and he was awarded £10 10s costs.

**The new showrooms and demonstration kitchen of Tricity Cookers, Ltd., 109, Kingsway, London, W.C.2, which was recently acquired by Thorn Electrical Industries, Ltd.**

## Electrical Exhibition at Taunton

Kerry's (Great Britain), Ltd., are holding an exhibition of television, radio and electrical equipment at the Burlington Hotel, 66, Station Road, Taunton, from 19th to 21st August, at which they are displaying the latest equipment of many well-known manufacturers including radio and television servicing equipment.

## Television Equipment for Venezuela

A contract to provide British equipment for a television service in Venezuela, totalling approximately £100,000, was signed at the Venezuelan Consulate in London on 9th July in the presence of the Consul, Dr. Rodriguez Jimenez, by Mr. L. J. King, secretary to Marconi's Wireless Telegraph Co., Ltd., which is designing, manufacturing and installing the equipment. A new company has been formed

to own and operate the service at Caracas, and will be known as Television Venezolana S.A., "Televisa" for short. The system will operate on the international standard of 625 lines, 50 cycles.

It consists of a 5 kW vision transmitter, a 3 kW sound transmitter, an associated aerial system, and complete studio installation. In addition the order calls for a complete mobile outside broadcasting unit with two camera channels and micro-wave links for relaying outside broadcasts back to the studio.

## Holidays with Pay Schemes

Etos, Ltd., has been registered in Edinburgh as a company limited by guarantee without share capital. Its objects are to promote, administer and manage schemes for the provision of holidays with pay for persons employed as workpeople in the electrical contracting industry in Scotland. The directors are Messrs. D. G. Lindsay, J. Bryne, J. Deans, T. Fulton, R. G. McLennan, F. Murphy, I. Sclar, R. A. Smith and W. A. Smith.

## Egyptian Import Restrictions

Among the goods which are subject to special permission from the Egyptian Exchange Controller when imported into Egypt against payments in sterling are electrical apparatus for domestic use, including irons, refrigerators and water heaters, and radio receiving sets and radiogramophones.

## Royal Highland Show

The South East Scotland Electricity Board in conjunction with the British Electrical Development Association exhibited at the Royal Highland Show which was held at Kelso from 17th to 20th June. The Duke and Duchess of Gloucester made a special tour of the stand on the opening day. The theme of the exhibit was "Electricity on the Farm" and to assist farmers and others interested the extensive range of electrical equipment was arranged in sections and included some of the latest developments in dairy equipment, barn machinery, poultry appliances, grain drying and pumping equipment, pig rearing, workshop and horticultural appliances. Much of the equipment was being displayed in Scotland for the first time. During the four day period of the show a constant stream of visitors viewed the stand, including a number of visitors from Australia and New Zealand.

## Impulse Generator in Stockholm

An impulse generator of 2,400,000 V for testing insulators and transformers, the second largest of its kind in Sweden, is to be included in the high-frequency laboratory of the Stockholm Institute of Technology. A cascade generator of 1,500,000 V to be used for testing cables and condensers will probably be installed later. The high-frequency laboratory will be housed in a new building that is now nearing completion and will form part of the "City of Science" that has grown up around the Institute of Technology in recent years.

## Prices of Materials

In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.

| | |
|---|---|
| ALUMINIUM Ingots .. .. | ton £157 0s 0d |
| COPPER, H.C. Electro .. .. | ton £287 0s 0d |
| Fire Refined 99·70 per cent .. | ton £284 0s 0d |
| Fire Refined 99·50 per cent .. | ton £276 0s 0d |
| COPPER Tubes .. .. .. | lb 2s 8½d |
| Sheet .. .. .. .. | ton £344 0s 0d |
| H.C. wire and strip .. .. | ton £320 0s 0d |
| LEAD, English .. .. .. | ton £132 10s 0d |
| Foreign .. .. .. .. | ton £131 0s 0d |
| MERCURY .. .. .. .. | flask £65 10s 0d |
| TIN .. .. .. .. .. | ton £970 0s 0d |
| ZINC, G.O.B. Foreign .. .. | ton £130 0s 0d |
| Electrolytic .. .. .. | ton £134 0s 0d |
| BRASS Tubes .. .. .. | lb 2s 3⅜d |
| Sheet .. .. .. .. | lb 2s 6½d |
| Wire .. .. .. .. | lb 2s 9½d |
| PHOSPHOR BRONZE | |
| Wire .. .. .. .. | lb 4s 1½d |
| RUBBER, No. 1 R.S.S. spot .. | lb 26⅜–27d |

## Equipment for N.A.T.O. Aircraft

Employment for British technicians on dollar-earning work in the Ferguson factories will result from the award on 7th July of a $2,500,000 contract by the United States Government to Thorn Electrical Industries, Ltd. The equipment, radio transmitters and receivers, will be used in N.A.T.O. aircraft.

## Lower Canadian Appliance Output

Further marked declines in the production of both washing machines and electric refrigerators in Canada are recorded in the latest figures issued by the Dominion Bureau of Statistics. Production of domestic-type washing machines dropped in February to 12,900 units compared with 27,000 in February last year, while factory shipments fell to 16,400 units from 25,600. Output of household electric refrigerators declined to 8,600 units from 31,400 in February last year, and the shipments decreased to 18,100 units from 31,200.

## Cable Testing

Power cables are not often tested after installation until a fault occurs and its position has to be found. But regular routine testing can, by the pre-detection of deterioration, convey early warning of impending trouble. A range of "Sen-Ter-Cell" equipments for the testing of and fault diagnosis in high voltage d.c. cables is available from Standard Telephones and Cables, Ltd. Bulletin F.CT.1, Rectifier

Division, Warwick Road, Boreham Wood, Herts, describes the alternative circuits used and the general features of the equipments, which are rated at 10 mA at the full test voltage in each instance, or at 20 mA for five minutes at reduced voltage. Eight types are specified from 3·5 to 80 kV, the larger ones being trailer or trolley mounted, but details of 20, 40 and 400 kV outfits are obtainable separately.

## Annual Holidays

The works of the Arora Co., Loughborough, will be closed for the annual holidays from 1st to 18th August.

The Engineering & Lighting Equipment Co., Ltd., is closing its works from 26th July to 10th August.

The head office and works of Higgs Motors, Ltd., Birmingham, will be closed from 25th July to 11th August.

Bill Switchgear, Ltd., is closing its works and offices from 25th July to 11th August.

The works and offices of Herman Smith (Smithlite), Ltd., will be closed from 25th July to 11th August.

Venner, Ltd., are closing their works from 25th July to 12th August.

The works of Nettle Accessories, Ltd., are closing from 25th July to 11th August.

The works of the Acru Electric Tool Manufacturing Co., Ltd., will be closed from 25th July to 12th August.

The Stalybridge factory of Aerialite, Ltd., will be closed from 21st July to 2nd August. The depots at Birmingham, Bristol, London and Manchester will operate as usual during this period.

The works and offices of the Morecambe Electrical Equipment Co., Ltd., will be closed from 25th July to 11th August.

## Trade Announcements

**Wild-Barfield Electric Furnaces, Ltd.**, has established an office in Scotland, in conjunction with its associate G.W.B. Electric Furnaces, Ltd., which will be under the control of its existing representative, Mr. D. McDermott. The office is at 131, West Regent Street, Glasgow, C.2 (telephone : Douglas 8839).

Mr. C. Tillotson, formerly on the staff of the London Service Department of **Ferranti, Ltd.**, has been appointed to represent the company in South Wales, Herefordshire and Gloucestershire, in succession to Mr. C. J. Howard, who has resigned from the company. For the time being, Mr. Tillotson may be contacted through the Radio Sales Department at Moston, Manchester, 10.

The **Telegraph Construction & Maintenance Co., Ltd.**, announces that arrangements are being made to move their Metals Division from Telcon Works, Greenwich, to the new town of Crawley, Sussex, where it is proposed to build a new factory for the production of its special alloys. The first stage of the removal is not likely to take place for about eighteen months.

A Continental office is being opened by **Sunvic Controls, Ltd.**, and its European manager, Mr. B. Hveissel, is transferring to Copenhagen where his address, as from 15th August, will be : Sunvic Controls, Ltd., Continental Office, Skindergade 38, Copenhagen K, Denmark.

The London sales office and the Railway Signalling Department of **Nife Batteries**, Redditch, Worcs, have been transferred to 53, Victoria Street, S.W.1 (telephone : Abbey 1412).

**Daly (Condensers), Ltd.**, informs us that its Canadian company, Daly-Arrow, Ltd., which was recently inaugurated in Toronto, has opened a factory in Toronto specializing in the production of electrolytic capacitors.

## Catalogues and Lists

**Resinoid & Mica Products, Ltd.**, 28, Queen Anne's Gate, London, S.W.1.—Illustrated brochure entitled " Plastics for Industry " containing a comprehensive survey of the methods of manufacture of plastic articles.

**Jennings Electric Co.**, Deramore Works, 183, Antrim Road, Belfast.—Illustrated folder on electric motors and current price list.

**S. N. Bridges & Co., Ltd.**, Bridges Place, Parsons Green Lane, London, S.W.6.—Illustrated leaflet on " Bridges " ratchet operated tangential pipe dies.

**A. H. Hunt (Capacitors), Ltd.**, Bendon Valley, Garratt Lane, Wandsworth, London, S.W.18.—Illustrated catalogue covering a range of foil and paper capacitors for power factor improvement and capacitor motors (CL.538).

**L. S. Collingridge & Co.**, 54, High Street, Harpenden, Herts.—List of insulating materials for the electrical and auto electrical trades which can, if required, be supplied in relatively small quantities.

**British Insulated Callender's Cables, Ltd.**, Norfolk House, Norfolk Street, London, W.C.2.—Illustrated catalogue on insulated cut-outs (314).

**Workman, Reed & Co., Ltd.**, Beacon Works, Hewish, near Bristol.—Illustrated folder on " Beacon " engine driven generating sets with rating ranging from 0.5 to 15 kVA at 110 or 230 V, single- or three-phase, 50 or 60 c/s.

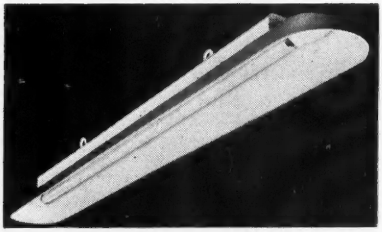
**Westinghouse Brake & Signal Co., Ltd.**, 82, York Way, King's Cross, London, N.1.—Fully illustrated technical brochure on the use and application of Westinghouse copper-oxide and " Westalite " rectifiers.

# RECENT INTRODUCTIONS

*Notes on New Electrical and Allied Products*

## P.V.C. Fluorescent Fittings

RIGID p.v.c. as developed by Imperial Chemical Industries, Ltd., is used as the reflecting material in the fluorescent lighting fittings which have just been brought out by NEW ERA INDUSTRIES, LTD., Stoneleigh Road, London, N.17. The material can operate in the most corrosive atmospheres without any great loss in its reflective properties and in this respect it is claimed to be equal to vitreous enamel and superior to stove enamelled steel. It is robust and virtually unbreakable.



**New Era single 5ft fluorescent fitting employing a rigid p.v.c. reflector**

The fittings consist of a formed steel spine so made that the rigid p.v.c. reflectors are easily detachable, the control gear being mounted within the spine. Both single 5ft and twin 4ft fittings are available.

## Mine Compressor Protection

To protect air compressors in mines against serious damage the ELECTRICAL APPARATUS CO., LTD., St. Albans, Hertfordshire, has developed a flameproof thermostat which is Buxton certified for Groups I, II and III. It comprises a wall or bracket fixing flameproof enclosure housing the thermostat switch which is operated by a sensitive phial through a length of armoured capillary tubing. Any substantial rise in temperature on a compressor is conveyed to the air outlet, so the phial is inserted in the supply line close to the discharge point. An indication of the actual discharge air temperature is given by a robust pedestal type dial thermometer mounted on the main thermostat enclosure. Provision is made for varying the tripping value, although to prevent unauthorized adjustment it is necessary to remove the main cover after isolating the supply. The thermostat itself embodies an air break butt contact type normally closed switch which is magnetically assisted to give a snap action.

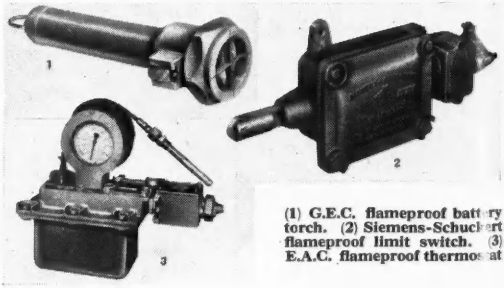
The only external wiring which it is necessary to arrange is the twin cable connection between the switch and the control gear associated with the compressor motor.

## Flameproof Battery Torch

A weatherproof and flameproof battery torch made by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, carries Ministry of Fuel and Power and Home Office certificates for use in situations where methane, petroleum vapour, acetone or town gas may be present. It incorporates a 3·5 V, 0·3 A "Osram" bulb in a separate holder with a spring contact to avoid crushing the contact pip against the battery. The bulb holder can be adjusted relative to the reflector to give either a flood or spot light.

## Flameproof Limit Switch

The flameproof limit switch made by SIEMENS-SCHUCKERT (GREAT BRITAIN), LTD., Faraday Works, Great West Road, Brentford, Middlesex, is built in accordance with the flameproof requirements for Groups I and II gas. It consists of a double break, single pole switch with two normally open and two normally closed contacts enclosed in an aluminium alloy




**(1) G.E.C. flameproof battery torch. (2) Siemens-Schuckert flameproof limit switch. (3) E.A.C. flameproof thermostat**

casing. One end of the enclosure carries a boss through which slides a large diameter operating plunger, the end of which is furnished with a roller to give a smooth action. The other end of the enclosure takes a compound filled gland for wire armoured cable up to $\frac{3}{4}$in diameter under armour, or a gland to take up to $\frac{3}{4}$in conduit.

At the gland end the enclosure carries a three-way moulding with socket inserts. A similar moulding is fitted into the gland and the sockets are connected by contact pins. In this way the gland can be readily mounted on or removed from the switch enclosure without disturbing any electrical connections. The dimensions of the switch enclosure are about 6in by 4in by 3in and the overall length of the unit, including the operating plunger and gland, is about 17in with a gland for armoured cable and 16in with a conduit gland.

## Hedge Cutter

The latest hedge cutter (model 814) made by C. F. WILSON, King Edward Street, Liverpool, incorporates an entirely new driving mechanism which is totally enclosed by a cast aluminium cutter head. The electric motor drives the

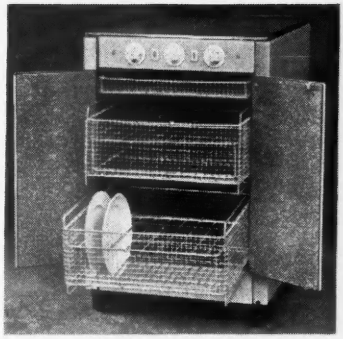
**Wilson hedge cutter**

central shaft to give an oscillating motion to the 12in blades, the connecting rod between shaft and blade having been eliminated by the new mechanism. This and other improvements introduced will give greater efficiency and longer life.

With 30ft of three-core flex, the price for 230 V or 110 V a.c. or d.c. models is £44 10s. Extra cable up to 200 yards can be supplied and a 110 V mobile generating plant is available for operating the hedge cutter away from the mains supply.

## Crockery Sterilizing Cupboard

The crockery sterilizing hotcupboard made by the ARORA CO., Rosebery Street, Loughborough, is primarily intended for use in hospitals and is a modified design of the company's 2ft hotcupboard having bottom



**"Arora" crockery sterilizing hotcupboard**

heating only, 2 kW loading controlled by a cooker thermostat. It is provided with three heavy gauge galvanized steel wire baskets, two for crockery and one for cutlery. The finish is cream, white or aluminium colour stoved enamel and where necessary vitreous enamel, the top being chromium plated steel. Casters can be fitted if required. The internal dimensions are about 24in high by 20in wide by 24in deep.

## Infra-Red Lamp

An infra-red lamp with an internal reflector for use on normal mains voltages between 200 and 260 V is available from the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. This "Osram" lamp, which is rated at 250 W, is similar to the 100/130 V "Osram" infra-red reflector lamp which is widely used in industry for process heating and paint drying. The internal silvering of the bulb provides the lamp with its own reflector, which projects the heat in the required direction, the end of the bulb being lightly obscured to diffuse the heat. The cap is mechanically attached to the bulb in order to ensure that it shall not be loosened under arduous service conditions.

## Surface Mounting Socket Outlet

The latest addition to the "Tunion" range of electrical accessories made by GEORGE TURNOCK, LTD., Tunion Works, Navigation Street, Walsall, Staffs, is a surface mounting socket outlet capable of accommodating either a three-pin 5 A or 15 A plug. Essentially it is a conventional unswitched and unshuttered 15 A socket upon which is superimposed a 5 A socket, the earthing contact being common. The base is of porcelain and the circular cover of brown moulded material. The dimensions are: diameter 3in; depth $1\frac{1}{4}$in.

# DUST AND FUME ABATEMENT

THE annual report for 1951 of Mr. W. A. Damon, chief inspector for England and Wales, on industrial establishments registered under the Alkali, etc., Works Regulation Act for the prevention of danger and avoidance of nuisance includes the report of Mr. E. A. B. Birse, chief inspector for Scotland. It is obtainable from H.M. Stationery Office, price 2s 1½d post free.

Observance of the requirements of the Act in 1951 was generally satisfactory; there were a number of infractions, but it was not necessary to institute legal proceedings last year. Works registered in England and Wales numbered 971 and operated 1,773 separate processes, net decreases of six and two respectively; in addition 74 works operating 111 processes in Scotland decreased by five and six respectively.

Although non-routine consultative visits to unregistered works represented only 10 per cent of the total inspections, it is felt that the tendency must be arrested. Either the number of official yearly inspections must be restored to the pre-war figure by the appointment of more inspectors, or the attention given to non-registrable establishments should be severely curtailed.

The latter include electricity generating stations, nine of which were visited last year jointly with Mr. A. N. East, chief engineer, Electricity Division, Ministry of Fuel and Power. Six of these visits were for the inspection of installations of particular interest for the avoidance of dust and grit emission; three were in connection with complaints. The conclusion was reached that the stations concerned could be held responsible only for deposits in their immediate vicinities; excessive deposits farther away originated from other sources. Remedial steps were taken.

Investigation of a complaint of dust emission from a generating station in Scotland showed that the dust came from pneumatic plant for extracting ashes from the boiler house. Complaints ceased after improvement of access to the cyclone arrestor to facilitate regular emptying.

The inspector's comments on registered establishments indicate that complaints about cement works will be inevitable while such works continue to operate at full capacity. Recent experience had shown that low-level emissions could be more serious contributors to local pollution than was at one time thought likely. Dust arising from the handling and packing of clinker and cement is now often the major cause of complaint, " but is in itself an indication of progress."

Electrostatic precipitation is the method most generally employed for the de-misting of chimney gases at cement works, but for various reasons, some of which are mentioned in this and the previous reports, this method has not always come up to earlier expectations. Low back-end temperatures do not greatly affect dust arrestment at newly constructed cement works where the electrical precipitators are built close to and between kiln and chimney. At older works where siting necessitated long flues the results may be serious. The gases contain about 40 per cent moisture, some of which will condense in long flues as a weak, but corrosive, acid. Condensation within the body of the precipitators will also result in corrosion and difficulty in operating the plant at the necessary high voltages.

In such circumstances the interior of a precipitator may need to be completely renewed every four years. Nevertheless low back-end temperatures appear to have come to stay because the resulting fuel saving is of greater importance than the evils mentioned.

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# A.M.E.E. MEETING

IN his report at the recent annual general meeting of the Association of Managerial Electrical Executive Mr. A. E. Morgan, the retiring president, referred to the progress of negotiations on the N.J.M.C. (" fourth leg ") since the signing of the agreement last year. He said there had been joint meetings with the British Electricity Authority which had promised to table salary scale proposals as soon as possible. On the staff side the three staff unions (A.M.E.E., E.P.E.A., and N.A.L.G.O.) had pressed for an interim increase on the provisional salaries of grades to be covered by the agreement, on account of the altered conditions since vesting date. While the B.E.A. had made certain offers in this respect they were subject to a salary " ceiling " of £2,000 which the staff side would not accept.

Dealing with compensation the president reported that to date, some 32 awards to members totalling approximately £3,000 per annum had been made and a test case at an early date in respect of municipal engineers not paid under the 1941 scale was anticipated.

The membership of the Association was now 653 (including associates and companions). It was pointed out that the Association covered all the sub-committees set up under the agreement except one, and therefore the majority of the staff of the B.E.A. and Electricity Boards coming under the provisions of the agreement were eligible for and strongly urged to join the Association.

The proceedings concluded with a presentation by the retiring president to the hon. treasurer, Major E. A. Barker, retiring after 23 years' service, while the newly elected president, Mr. G. J. Moody, made a similar presentation to Mr. A. E. Morgan for his services as hon. secretary, a position he was now relinquishing.

# ELECTRICITY SUPPLY

## Cross-Channel Interconnection

## Output and Temperature Comparison

THE British Electricity Authority has approved in principle the interim report on the proposed interconnection of the British and French grid systems submitted by the Joint Committee of representatives of the Authority and Electricité de France. It has adopted the recommendation to undertake a development programme and has authorized an expenditure of up to £125,000 for this purpose.

### *Ayrshire Generation Scheme*

The Scottish Divisional Coal Board, in conjunction with the British Electricity Authority, will shortly announce a scheme for the erection in Ayrshire of a new steam generating plant at a cost of approximately £4,000,000. It will have a capacity of 60 MW, compared with 200 MW at the new Braehead power station, and will be the only plant in Britain which will use washery slurry as the fuel for the generation of electric power. The slurry will come from the washery plant at a new colliery.

### *West Suffolk Rural Electrification*

At its annual meeting at Bury St. Edmunds recently the West Suffolk Parish Councils' Association urged that representations should be made to the Chancellor of the Exchequer for greater expenditure to be allowed on rural electrification. Mrs. A. K. Shrewsbury gave instances of houses which she said had been wired for four or five years and were still without electricity.

### *Higher Charges in Southern Area*

The Southern Electricity Board has announced tariff alterations to meet increased costs. These additional costs, the Board states, amount to £1½ million a year and have produced a marked change in the trading position, the estimates for the current year disclosing a substantial deficit. It is recalled that when the standard domestic tariff was introduced in October last some consumers had to pay more and others less, but the overall effect was to bring in approximately the same revenue.

The tariff changes which the Board has decided upon are: For electricity consumed in domestic premises after the first normal meter reading following 1st October next the primary rates of 5d and 6d/kWh for credit and prepayment supplies are to be increased to 5½d and 6½d respectively and the secondary rate from ¾d to 1d kWh. The Board has also decided to increase the total revenue derived from supplies to commercial and farming premises by approximately 12½ per cent concurrently with the introduction of standard commercial and standard farming tariffs as from 1st April next.

The Board's proposals were placed before the Southern Electricity Consultative Council which suggested a modification to reduce the number of kWh chargeable at the primary rate, but the Board considers that the present structure of the tariff is equitable.

**This handsome windmill at Willesborough, Kent, is one of five for which preservation orders have been made by the Kent County Council. It is still in active use, an electric motor providing against windless periods, and it is electrically lighted**

### *Sodium Lighting at Bracknell*

Recently a trial section of Class "A" sodium lighting has been brought into service in the new town of Bracknell. The installation, which was planned by the chief engineer of the Bracknell Development Corporation (Mr. J. T. Kendal, A.M.I.C.E., M.I.Mun.E.), utilizes Stewarts & Lloyds type GB.583 columns and the new

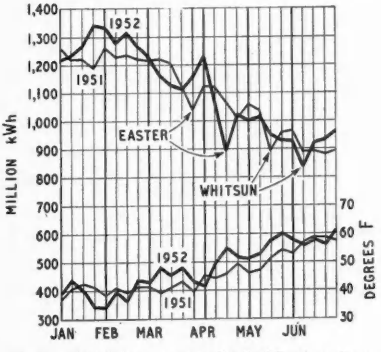
**Sodium lighting installation at Bracknell utilizing Siemens sealed drum refractor lanterns**

Siemens sealed drum refractor lanterns with Sieray 140 W sodium lamps.

A novel feature of the Siemens lantern is that the vacuum jacket of the sodium lamp is sealed to the drum refractor assembly by means of a heat resisting rubber gasket in such a way that the assembly is dustproof and watertight. The removal of the conical end cap gives access to the lamp which may be changed without breaking any seals, thus reducing the maintenance to a minimum. Normally the only cleaning required is that of the exterior of the drum refractor and this can conveniently be done whenever a lamp is changed. In practice, owing to its shape very little dirt accumulates on the glassware and rain has a marked cleaning effect. All the lanterns, control gear and lamps were supplied by Messrs. Siemens Electric Lamps and Supplies, Ltd.

## *Six Months' Output*

During the twenty-six weeks ended 27th June last 28,707·2 million kWh was sent out for public supply from solid-fuel fired stations in Great Britain. This compares with 28,493·8 million kWh in the corresponding period of 1951. The accompanying graph compares the weekly fluctuations in output and temperature.




**Weekly electricity output (solid-fuel fired stations only) and average weekly temperature curves for the 26 weeks ended 27th June, 1952, and 29th June, 1951**

## *Higher District Heating Charges*

Westminster City Council has decided to increase the charges for space heating at Churchill Gardens and Russell House, Pimlico. For a bed-sitting room the charge will go up from 3s 7d to 4s 3d and for a five-roomed flat from 10s 9d to 12s 7d. At a meeting of the City Council when this was agreed to, Miss Paton Walsh, chairman of the Housing Committee, said that the tenants had recently asked that the heating should remain on 1½ hours later (to 11.30 p.m.) during the heating season and this extra cost was included in the new charge. Giving other reasons for raising the charges, Miss Paton Walsh referred to the increase in the cost of fuel at Battersea power station from 67s to 80s a ton. There had also been delay in completing section I of the scheme; as more flats were connected they envisaged cheaper running costs. Eventually the scheme had to be self-supporting.

## *Objection to Power Station*

Although the site of the proposed power station in the Machen area of South Wales is wholly in Monmouthshire, the Glamorgan County Council is also objecting to the scheme. At a meeting of the County Council Planning Committee the chairman said that the effect on the landscape as seen from Glamorgan would be detrimental.

## *Gas Board and Street Lighting*

When the question of charges for gas street lighting was discussed at a meeting of the North Western Gas Consultative Council, the chairman said that it was the policy of the Board to recommend local authorities to change to electricity. Because of wastage from leakages that could not be prevented gas for street lighting was not economical.

## *Charges to Tenants*

Landlords who overcharge sub-tenants for electricity were criticized at a recent meeting of the South Eastern Electricity Consultative Council. It was alleged that there was a great deal of exploitation of this kind. A report from the Electricity Board pointed out that the imposition of a maximum charge might cause the consumer to stop giving a subsidiary supply to his tenants. The Council agreed that the chairman should discuss the matter further with the Board and if necessary raise the question with the Minister.

## *Rural Extension*

Uckfield (Sussex) R.D.C. has approved the erection of overhead lines to supply Holtye and district.

# FINANCIAL SECTION

## Company Notes and Stock Exchange Activities

### Reports and Dividends

**Marryat & Scott Holdings, Ltd.,** reports a consolidated trading profit for the year to 31st March last of £113,117, as compared with £92,978 for the preceding year, and after deducting all charges, including £72,000 for taxation, there is a net balance of £37,088 (against £39,013). It is proposed to pay an ordinary dividend for the year of 22½ per cent, and to carry forward £26,150 (against £7,524 brought in).

In his circulated statement, Mr. M. D. Scott (chairman and managing director) says that the value of lift sales for the past year again exceeded previous records, and export trade in lifts was also the best in the history of Marryat & Scott, Ltd., and could have been bettered if more materials had been available and there had been less restriction on imports to some of the countries they supply. The volume of contracting work by Marryat & Place, Ltd., has increased and John Bennie, Ltd., the subsidiary of Marryat & Scott, Ltd., had made a satisfactory contribution to the overall result.

**Walsall Conduits, Ltd.,** report a group trading profit of £440,338 for 1951, as compared with £396,004 for 1950, and after providing £230,904 for taxation, there is a net profit of £209,434 (against £219,021). It is proposed to pay a final ordinary dividend of 35 per cent (same) and a bonus of 15 per cent (same), maintaining the distribution for the year at 70 per cent. The balance carried forward is £589,337 (against £483,638 brought in).

The board recommends, subject to the necessary resolutions being passed at the forthcoming extraordinary meeting, to make a capital bonus issue of one ordinary share for every three held. The new shares will rank *pari passu* with existing ordinary shares, except that they will not carry the right to any dividend or cash bonus in respect of the year to 31st December last. The proposal will entail the capitalization of £50,000 of reserves.

In his circulated statement, Mr. A. E. Read (chairman) says that the scarcity of materials continued during the year under review and has adversely affected the results of the year's trading. For the first time in sixty years a portion of their plant was, for a short period, closed down owing to lack of steel. There has recently been a definite improvement in the steel supply position. They have at the present time a full order book for all their products, with the exception of ceramics, in which branch cancellations of orders from Australia have had some effect on output.

**The Revo Electric Co., Ltd.,** recommends a final dividend of 22½ per cent actual, less tax (against a final dividend of 12½ per cent and a cash bonus of 10 per cent for 1951), making a total distribution for the year to 31st March last of 27½ per cent (same). The profit for the year after all charges, including taxation, is £170,542, including the profits of the subsidiary company from 21st August, 1951, to 31st March, 1952 (£121,763). United Kingdom taxation absorbed £240,541 (£165,051).

**The Dubilier Condenser Co. (1925), Ltd.,** reports a trading profit for 1951-52 of £411,212, as compared with £214,750 for the previous year. Taxation absorbs £212,393, and the net profit is £130,285 (against £70,421). A sum of £108,566 (£50,000) is placed to reserves, and it is proposed to pay an ordinary dividend for the year of 28 per cent (against 20 per cent). The balance carried forward is £85,830 (against £84,860 brought in). The board proposes to capitalize £49,260 by issuing a free share bonus of two 1s ordinary shares for every five ordinary shares held.

**Pinchin, Johnson & Associates, Ltd.,** report a consolidated trading profit for the year to 31st March last of £2,027,164, as compared with £1,739,425 for 1950-51, and after meeting all charges, including £1,076,178 for taxation, there is a net profit of £697,194 (against £649,676). It is proposed to pay a final ordinary dividend of 17½ per cent, again making 25 per cent for the year. The group balance carried forward is £743,908 (against £856,591 brought in).

**Hick, Hargreaves & Co., Ltd.,** report a trading profit of £369,967 for the year ended 31st March last, as compared with £348,174 for the previous year, and after deducting all charges, there is a net profit of £143,789 (£140,051). After making various allocations, it is proposed to pay a final dividend of 15 per cent, making 20 per cent for the year. The balance carried forward is £23,010 (against £17,861 brought in).

**The Electric & General Investment Co., Ltd.,** reports a net profit for the year ended 31st May last of £9,048, as compared with £8,652 for 1950-51. The dividend for the year on the old ordinary is unchanged at 15 per cent, and 7½ per cent is paid on the new ordinary.

## New Companies

**Price Electrical (Lydney), Ltd.**—Registered 7th July. Capital £2,000. To acquire the business formerly carried on by G. W. Price as G. W. Price & Co., at High Street, Lydney, Glos. and carry on the business of general and electrical engineers and contractors, manufacturers of electronic, electrical or electro-mechanical appliances and equipment, etc. Directors: G. W. Price (chairman) and Kathleen M. Price. Regd. office: 36, High Street, Lydney, Glos.

**Morris Radio Electrical Service, Ltd.**—Registered 28th June. Capital £500. Directors: C. H. Morris and Gladys L. Morris. Regd. office: 615, Bordesley Green, Birmingham.

**E. P. Fox, Ltd.**—Registered 30th June. Capital £15,000. Radio and television engineers, etc. Directors: E. P. Fox and Florence C. Fox. Regd. office: 109, Walton Road, East Molesey, Surrey.

**W. Herbert (Fittings), Ltd.**—Registered 30th June. Capital £1,000. Manufacturers of and dealers in electrical supplies and fittings, etc. W. G. J. Herbert is the first director. Regd. office: 220, King Street, Hammersmith, London, W.6.

**J. R. Hawkes & Co., Ltd.**—Registered 28th June. Capital £15,000. Electrical engineers and general electrical installation contractors, etc. Directors: Hilda Hawkes and J. M. Hawkes. Regd. office: 146, Belgrave Gate, Leicester.

**F. Goodall & Co., Ltd.**—Registered 25th June. Capital £1,000. Electrical and electronic engineers and contractors, mechanical engineers, etc. Directors: F. Goodall and H. Coates. Regd. office: 134, John Clay Street, South Shields.

**Glancy & Davis, Ltd.**—Registered 1st July. Capital £1,000. Manufacturers and repairers of and wholesale and retail dealers in wireless and television sets, electrical fittings, etc. Directors: M. Glancy and S. Davis. Regd. office: 62, Brook Street, W.1.

**Wm. Y. McAdam, Ltd.**—Registered in Edinburgh 1st July. Capital £5,000. Electrical engineers, electricians, etc. Directors: G. Macleod and J. G. Graham. Regd. office: 32/34, Campbell Street, Hamilton.

**Yorkshire Rewinds, Ltd.** — Registered 2nd July. Capital £500. Manufacturers of and dealers in armatures, magnetos, dynamos, motors and transformers; coil rewinders, electrical engineers, etc. A. T. Walker is the first director. Regd. office: 32, Norfolk Lane, Sheffield, 1.

**Electro-Mechanical Components, Ltd.** Registered 1st July. Capital £100. Manufacturers and repairers of dynamos, motors, armatures, magnetos, batteries, conductors, insulators, transformers and general electrical plant and machinery, etc. Directors: A. O. S. Davies, J. C. Turl and Barbara G. Price. Regd. office: Prudential Buildings, Guildford, Surrey.

## Liquidations

**Frank Peasgood, Ltd.**—Winding up voluntarily as a members' winding-up. Liquidator, Mr. G. F. Davies, 3, St. Helen's Place, London, E.C.3.

**Cumbrian Electrical Co., Ltd.**—Winding up voluntarily. Liquidator, Mr. F. Kenyon, Midland Bank Chambers, Penrith.

**Regent Radio Co., Ltd.**—Winding up voluntarily. Liquidator, Mr. R. A. Palmer, Regent House, 45, Sheep Street, Northampton.

## Bankruptcies

**T. Maund,** 37, Earle Road, Bramhall, Ches, lately carrying on business at 80, Wellington Road North, Heaton Norris, Stockport, Lancs, as an electrical engineer, under the style of Beacon Electrical Co., now traveller for a leather goods manufacturer.—Supplemental dividend of 2⅛d in the £, payable at the Official Receiver's office, 20, Byrom Street, Manchester, 3.

**R. Walster,** carrying on business in co-partnership as Davis & Walster, at 198, Hessle Road, Kingston-upon-Hull, electrical engineers and contractors.—Order made 10th June suspending discharge for three months until 10th September, 1952.

**R. H. Winslade,** 7, Collingwood Mount, Portsmouth Road, Camberley, Surrey, electrical engineer.—Trustee, Mr. N. W. Osborne, 11-12, Finsbury Square, London, E.C.2, appointed 7th July.

**S. F. Bent,** formerly carrying on business as S. F. Bent & Sons, electrical contractors, at 362, Ashton New Road, Bradford, Manchester.—Last day for receiving proofs for dividend 25th July. Trustee, Mr. F. C. Ormrod, 20, Byrom Street, Manchester, Official Receiver.

**W. D. Newell,** carrying on business at 35, Duke Street, Padstow, Cornwall, radio and electrical engineer.—Last day for receiving proofs for dividend 25th July. Trustee, Mr. B. Russell, 25, Market Place, Camelford, Cornwall.

**D. N. Bateman,** residing and lately carrying on business under the style of "Villiers Electric," at 1, North Villiers Street, Leamington Spa, Warwickshire, radio and electrical engineer.—Last day for receiving proofs for dividend 26th July. Trustee, Mr. R. K. Clark, Somerset House, 37, Temple Street, Birmingham, 2, Official Receiver.

# STOCKS and SHARES

STOCK Exchange markets have seen further progress in the rally which began towards the end of last month, with industrials making most of the running. Credit for the performance is given mainly to the Chancellor's latest gold reserve figures, and to better industrial news, particularly from the coal, steel and textile sections. The movement remains accompanied by too little activity to carry much conviction, but indicates at least that markets are ready enough to respond to encouragement. Much of the interest in the industrial market continues to centre round capital issues. The way in which the premiums on the new shares issued by Henley's, Siemens, Telegraph Construction and Allen West have gone ahead from their opening quotations supports again the market view that these occasions present the enterprising investor with what the Stock Exchange calls "scope for talent."

## General Electric

The General Electric Company's £1 ordinary shares have hardened from 74s 6d to 79s 6d since last month's news of the proposed 100 per cent capital bonus. Shareholders will be pleased to see the company's nominal capital at a figure more in keeping with the assets employed in the business, but it is not generally supposed that the operation has much bearing on dividend prospects. The G.E.C.'s financial year ended in March, and the final dividend was declared last time towards the end of July. On this occasion, the capital ranking for the payment will have been raised by the 1,700,000 ordinary shares issued at 72s 6d in February. At that time, the company expected that despite difficulties connected with labour costs and raw materials, it would be possible to declare a final payment of 15 per cent, again making a total of 22½ per cent for the year. The capital bonus proposal will not come up for approval until the annual meeting. It will bring the total issued ordinary capital to £11¾ million.

## T. C. and M. New Shares

Telegraph Construction & Maintenance £1 ordinary are now quoted ex both the free bonus issue of one-in-three, and the "rights" offer of new shares for cash. It may simplify matters for shareholders to note that, as a result of the dual-purpose issues, the holder of 100 original shares receives 33 new shares free, and the right to apply for a further 66 shares at 21s 6d. Payment in full for the latter is due on 22nd July, and allotment letters may be renounced until 6th August. The new shares will rank equally with the old, except in respect of this month's interim payment. They are quoted at 2s premium on the offered price. According to the company's circular, earnings are likely to be adequate to provide for a 7½ per cent dividend on the larger capital. This would be equivalent to the former rate of 10 per cent, reduced in proportion by the bonus issue. On this assumption, there is a prospective yield of £6 7s 9d per cent on the new shares at an all-in price of 23s 6d free of stamp duty.

## Walsall Conduits Results

Results for 1951 now published by Walsall Conduits record another advance in the group trading profit to a total of £440,000. Larger tax provisions this time leave the net surplus rather lower than before, at £209,000, but this still covers the preference dividend and the maintenance of the ordinary distribution, with about £150,000 to spare. The total ordinary dividend of 70 per cent (including 15 per cent as bonus) is the sixth successive payment at that rate. Nominal ordinary capital has remained at £150,000 during the consistent expansion of the business, and has come to look very small in relation to the figures on the assets side of the balance-sheet: capital actually employed amounts now to more than a million. A proposed share bonus of 25 per cent will do something to correct the disparity.

## Crompton Parkinson Ordinary

There is now a single quotation in the Stock Exchange lists for Crompton Parkinson ordinary stock, the vote-less "A" shares having disappeared in the recently approved merger of the old "A" and ordinary into stock of one class. The 12½ per cent capital bonus now being distributed goes only to the former ordinary stockholders, by way of compensation for surrendered voting power. It involves the capitalization of less than £20,000, and is not regarded in the market as materially affecting dividend prospects on the reorganized ordinary capital, which totals nearly £3·1 million.

## Company News

The 1s ordinary shares of the Dubilier Condenser Company, which has just produced outstandingly good annual results, are being dealt in around 3s. They show a yield of over 9 per cent on the 28 per cent dividend declared in respect of the year ended in March. Last year's 20 per cent was five times covered by earnings, so that, with trading profits virtually doubled in the latest period, the dividend remains in the highly conservative class. Another capital bonus, this time of two free shares for every five held, is proposed. Revo Electric 10s shares improved to 35s on the maintenance of the dividend at a total of 27½ per cent, from net profits 40 per cent higher than last year's. They show a yield of over 7¾ per cent. Henley's new shares, 7s 6d paid, have hardened to 9s bid, and the new Siemens are 3s over the price of issue.

# Electrical Investments

## *Past Week's Price Changes*

| Company | Dividend Previous | Dividend Last | Middle Price July 14 1952 | Week's Rise or Fall | Est. Yield £ | Est. Yield s | Est. Yield d |
|---|---|---|---|---|---|---|---|
| *Gilt-edged and Overseas Stocks* | | | | | | | |
| Brit. Elec. 1968/73 | 3 | 3 | 81½ | +1½ | 3 | 13 | 7 |
| Brit. Elec. 1974/77 | 3 | 3 | 80 | +1½ | 3 | 15 | 0 |
| Brit. Elec. 1976/79 | 3½ | 3½ | 86 | +1 | 4 | 1 | 7 |
| Brit. Elec. 1974/79 | — | 4½ | 98½ | — | 4 | 6 | 6 |
| Calcutta Elec. .. | 6† | 6† | 20/9 | +9d | 5 | 15 | 8† |
| East African Power | 7 | 7 | 24/6 | +1/- | 5 | 14 | 3 |
| Nigerian Elec. .. | 10 | 10 | 20/- | — | 10 | 0 | 0 |
| Palestine Elec. "A" | 5† | 5† | 13/6 | — | 7 | 8 | 2† |
| Perak Hydro-Elec. | Nil | Nil | 11/6 | — | | Nil | |
| *Equipment and Manufacturing* | | | | | | | |
| Aberdare Cables (5/-) | 20 | 20 | 11/- | +3d | 9 | 1 | 10 |
| Aerialite (1/-) .. | 83½ | 88½ | 7/3 | — | 12 | 4 | 0 |
| Aron Elec. Ord. .. | 15 | 15 | 32/6 | — | 9 | 4 | 8 |
| Assoc. Elec. Ord. .. | 20 | 20 | 69/6 | — | 5 | 15 | 2 |
| Automatic Tel. & El. | 15 | 15 | 55/- | +⅛ | 5 | 9 | 1 |
| Babcock & Wilcox | 18 | 18 | 63/9 | +⅛ | 5 | 12 | 10 |
| Baldwin, H. J. (2/-) | 25 | 25 | 4/9 | — | 10 | 10 | 6 |
| Bakelite (10/-) .. | — | — | 16/3 | −9d | | — | |
| British Aluminium | 10 | 12 | 41/6 | +2/3 | 5 | 15 | 8 |
| B.I. Callender's .. | 7½ | 9 | 30/3 | +6d | 5 | 19 | 0 |
| British Thermostat (5/-) .. .. | 30 | 30 | 24/6 | — | 6 | 2 | 5 |
| British Vac. Cleaner (5/-) .. .. | 25 | 25 | 12/6 | — | 10 | 0 | 0 |
| Brook Motors (10/-) | 20 | 20 | 28/9 | — | 6 | 19 | 2 |
| Brush Ord. (5/-) .. | 10 | 10 | 5/- | +6d | 10 | 0 | 0 |
| A. F. Bulgin (1/-).. | 27½ | 30 | 2/6 | — | 12 | 0 | 0 |
| Burco (5/-) .. | 42½ | 38½ | 18/9 | — | 10 | 6 | 8 |
| Chloride El. Storage | 15 | 15 | 56/3 | +⅛ | 5 | 6 | 8 |
| Cole, E. K. (5/-) .. | 25 | 25* | 15/- | — | 8 | 6 | 8 |
| Cossor, A. C. (5/-) | Nil | Nil | 11/3 | +6d | | — | |
| Crabtree (10/-) .. | 17½ | 17½ | 31/- | — | 5 | 13 | 0 |
| Crompton Parkinson Ord. (5/-) .. | 11¼ | 11¼ | 8/6 | +3d | 6 | 12 | 3 |
| De La Rue (5/-) .. | 50 | 35* | 10/- | −9d | 12 | 10 | 0* |
| Decca (1/-) .. .. | 112½ | 112½ | 16/- | +1/- | 7 | 0 | 9 |
| Dewhurst (2/-) .. | 35 | 22½* | 4/6 | — | | — | |
| Dictograph Tel. (2/-) | 20 | 20 | 4/6 | — | 8 | 17 | 9 |
| E.M.I. (10/-) .. | 8 | 12 | 14/6 | +9d | 8 | 5 | 6 |
| Electrical Components (5/-) .. | 20 | 20 | 10/- | — | 10 | 0 | 0 |
| Elec. Construction | 15 | 15 | 43/6 | +1/- | 6 | 18 | 0 |
| Enfield Cable Ord. | 7½ | 7½ | 18/- | +1/- | 8 | 6 | 8 |
| English Electric .. | 15 | 15 | 53/6 | — | 5 | 12 | 0 |
| Ericsson Tel. (5/-) | 22† | 22*† | 35/- | +9d | 3 | 2 | 9† |
| Ever Ready (5/-).. | 35 | 35 | 22/9 | +9d | 7 | 13 | 9 |
| Falk Stadelmann | 15 | 15 | 35/9 | — | 8 | 7 | 10 |
| G.E.C. Ord. .. | 17½ | 22½ | 79/6 | — | 5 | 13 | 2 |
| General Cables (5/-) | 30 | 30 | 12/6 | — | 12 | 0 | 0 |
| Greenwood & Batley | 15 | 15 | 40/- | — | 7 | 10 | 0 |
| Hackbridge Cable (5/-) .. .. | 20 | 20 | 9/9 | — | 10 | 5 | 2 |
| Hackbridge Hewittic (5/-) .. .. | 18 | 20 | 15/- | +9d | 6 | 13 | 4 |
| Hall Tel. Acc. (10/-) | 10 | 10 | 10/- | — | 10 | 0 | 0 |
| Heatrae (2/-) .. | 12½ | 12½ | 4/- | — | 6 | 5 | 0 |
| Henleys (5/-) .. | 20 | 20 | 15/3 | — | 6 | 12 | 3 |
| Holophane (5/-) .. | 15 | 15 | 10/- | — | | — | |
| Hoover (5/-) .. | 37½ | 35* | 23/3 | +⅛ | 7 | 10 | 6 |

| Company | Dividend Previous | Dividend Last | Middle Price July 14 1952 | Week's Rise or Fall | Est. Yield £ | Est. Yield s | Est. Yield d |
|---|---|---|---|---|---|---|---|
| *Equipment and Manufacturing (continued)* | | | | | | | |
| Intl. Combustion (5/-) .. .. | 20 | 25 | 21/9 | +3d | 5 | 15 | 0 |
| Johnson & Phillips | 15 | 15 | 49/6 | +⅛ | 6 | 1 | 3 |
| Lancashire Dynamo | 22½ | 12½* | 38/6 | — | 6 | 9 | 1 |
| Laurence, Scott (5/-) | 12½ | 15 | 11/9 | — | 6 | 7 | 8 |
| London Elec. Wire | 10 | 12½ | 43/9 | +1/9 | 5 | 14 | 3 |
| J. Lucas .. .. | 17½ | 7½* | 31/3 | +⅛ | 4 | 16 | 0 |
| Marryat & S. (2/-) | 22½ | 22½ | 5/- | — | 9 | 0 | 0 |
| Mather & Platt .. | 12½ | 12½ | 39/6 | +3/3 | 6 | 6 | 7 |
| Metal Industries.. | 10 | 15 | 41/6 | +1/6 | 7 | 4 | 6 |
| Mid. Elec. Mfg. .. | 15 | 15 | 55/- | — | 5 | 9 | 0 |
| Murex .. .. | 10 | 12½ | 51/3 | +3/3 | 4 | 17 | 6 |
| Newman Ind. (2/-) | 6 | 10 | 2/6 | — | 8 | 0 | 0 |
| Oldham & Son (1/-) | 30 | 30 | 4/3 | — | 7 | 1 | 3 |
| Parnall (Yate) (5/-) | 6 | 6 | 3/3 | +3d | 9 | 4 | 6 |
| Parsons, C. A. .. | 15 | 10* | 47/6 | — | 4 | 4 | 3 |
| Plessey (5/-) .. | 20 | 22½ | 17/- | — | 6 | 12 | 4 |
| Pye Deferred (5/-) | 35 | 18* | 15/- | — | 6 | 0 | 0 |
| Revo (10/-) .. | 27½ | 27½ | 35/- | +⅛ | 7 | 17 | 3 |
| Reyrolle .. .. | 15 | 10* | 42/- | — | 4 | 15 | 3 |
| Scot. Cable (4/-) .. | 30 | 32 | 20/9 | +2/- | 6 | 3 | 6 |
| Siemens Ord. .. | 10 | 10 | 30/- | +⅛ | 6 | 13 | 4 |
| Strand Elec. (5/-).. | 17½ | 17½ | 8/3 | — | 10 | 12 | 2 |
| Sturtevant (5/-) .. | 16¾† | 17¾*† | 21/3 | — | | — | |
| Switchgear & Cowans (5/-) .. .. | 22½ | 22½ | 13/9 | — | 8 | 3 | 8 |
| Taylor T. (5/-) .. | 20 | 20 | 20/- | — | 5 | 0 | 0 |
| T.C.C. (10/-) .. | 20 | 20* | 36/3 | — | | — | |
| T.C. & M. .. | 10 | 10 | 23/-xr | — | | — | |
| Telephone Mfg. (5/-) | 10 | 10 | 7/9 | — | 6 | 9 | 0 |
| Thorn Elec. (5/-) .. | 20 | 10* | 8/6 | +9d | 5 | 17 | 8 |
| Tube Investments | 25 | 25 | 51/3 | −3d | | — | |
| Vactric (5/-) .. | Nil | Nil | 4/6 | — | | Nil | |
| Veritys (5/-) .. | Nil | 7½ | 3/9 | — | 10 | 0 | 0 |
| Walsall Conduits (4/-) .. .. | 70 | 70 | 49/6 | +3/3 | 5 | 13 | 3 |
| Ward & Goldstone (5/-) .. .. | 44 | 45* | 38/- | +1/9 | 5 | 18 | 5 |
| Watford (2/-) .. | 25 | 25 | 6/- | — | 8 | 6 | 8 |
| Westinghouse Brake | 14 | 14 | 45/- | — | 6 | 4 | 6 |
| West, Allen (5/-) .. | 12½ | 15 | 10/9 | +1/6 | 6 | 19 | 6 |
| *Trusts, Transport and Communications* | | | | | | | |
| Anglo-Am. Tel.: A Ord. .. .. | — | 4½ | 77½ | +4 | 5 | 16 | 2 |
| Ord. .. .. | — | 56/3 | 50 | — | 5 | 12 | 6 |
| Anglo-Portuguese | 8 | 8 | 20/3 | — | 7 | 18 | 0 |
| Brit. Elec. Traction: Def. Ord. .. | 22½ | 25 | 395 | +20 | 6 | 6 | 7 |
| Cable & Wireless: Ord. .. .. | 6 | 8 | 110½ | — | 7 | 4 | 10 |
| 4% Loan .. | 4 | 4 | 96 | — | 4 | 3 | 4 |
| Calcutta Trams .. | 6† | 6† | 22/6 | +6d | 5 | 6 | 8† |
| Cape Elec. Trams | 4 | 5 | 12/6 | — | 8 | 0 | 0 |
| Marconi Marine .. | 7½ | 10 | 28/- | +6d | 7 | 2 | 10 |
| Oriental Tel. Ord. | 16 | 16 | 53/9 | — | | — | |
| Telephone Props. | 8 | 8 | 28/9 | — | 5 | 11 | 4 |
| Tele. Rentals (5/-) | 10 | 10 | 8/3 | — | 6 | 1 | 3 |

* After capital bonus.
† Dividends are paid free of Income Tax.

# Engineering in Europe

*Survey of Current Literature*

A SIMPLE solution of the problem of testing electric meters *in situ* takes a form more or less similar to a Morse tapewriter and its operation is almost automatic, except for manual switching operations. The record on the tape is obtained by connecting the instrument to the meter under test and breaking the connection after a predetermined number of revolutions of the tester disc. This produces lines of a certain length on the tape, comparison of which with the records obtained with a standard meter and a simple converting calculation yield the exact value of the percentage error of the meter.

The counting disc of the instrument is driven by a fractional h.p. motor (d.c.) supplied through a copper-oxide rectifier and the handy instrument also contains two relays and an artificial load circuit on which the meter is tested. The economic advantages of this instrument are obvious as it enables an operator to test about 30 meters daily, while a controller will easily evaluate about 300 meter test records in the same time.—" Portable Recording Electric Meter Tester," A. Righi, *L'Elettrotecnica*, Vol. 39, No. 2, pp. 56–60, February, 1952, in Italian.

## Steel Conductors

The average loading of agricultural distribution systems justifies the use of steel conductors wherever possible. However, the choice of the steel section to be used has up to now been more or less a matter of random selection, because the problem of a rational design of even the simple steel conductor lines with single load at the end has not yet been studied. It is well known that while the external inductive reactance of a steel conductor is nearly independent of the conductor section, the internal reactance of such conductors is considerable and depends, just as the active resistance, on the current. The economical current density for steel conductors is 0·35–0·45 A/mm², but the voltage drops would favour the choice of lower values, say 0·1–0·3 A/mm². The lengths of the 6 and 10 kV feeders in agricultural districts ranging from 8–15 km, 0·45–0·50 A/mm² will be the permissible limit for steel lines.

The calculation presented refers to such lines with stranded steel conductors and is based on inductance and resistance values of steel conductors contained in the Soviet standards, and determined for sections from 25–70 mm², assuming a conductor spacing of 1 m. The external inductive reactance varies then from 37 to 33 Ω/km. The actual calculation is based on an assumed linear relation between specific impedance of the line and current, which in most cases will be sufficient as a practical approximation. Two numerical examples are given.—" Analytical Method of Calculating Open Systems with Steel Conductors," V. K. Plyugachev, *Elektrichestvo*, No. 3, pp. 48–52, 1952, in Russian.

## Transformer Oil Regeneration

Comprehensive tests on regeneration of transformer oils carried out in the oil laboratory of the Ministry of Power Stations, U.S.S.R., show that in the case of oils with a low degree of acidification (acid number, e.g., 0·28), by treatment with 3 per cent $H_2SO_4$ and 4 per cent fuller's earth the acid number could be reduced to 0·03 (i.e., below the fresh oil standard of 0·04). By increasing the amount of bleaching earth to 10 per cent, the acid number could be further reduced, but only at the expense of the stability of the oil. An increase in the quantity of $H_2SO_4$ produced initial improvement and subsequent deterioration of the stability of the regenerate. It should be noted that used oils of the same acid number might still contain widely varying products of ageing, thus the results obtained must only be taken as general indications.

Heavily aged oils (0·48 mg KOH) were

Readers who require accurate full translations of any of the articles abstracted in this section can be put into touch with the translators who will supply them at the current rates.—Editors, *Electrical Review*.

treated with concentrations of 2, 3 and 5 per cent $H_2SO_4$, and with 5, 8, 12 and 15 per cent of fuller's earth. Reduction of the acid number to the standard value 0·04 required 2–3 per cent $H_2SO_4$ and 12 per cent and more of fuller's earth or, alternatively, 5 per cent $H_2SO_4$ and 8·3 per cent bleaching earth. The tests were also extended to oils of acid numbers up to 0·93 with a wide variation of treatments. These tests, too, were successful where recovery of the original properties of the oil (including colour) was concerned, but the stability was always bad. It follows that durable regeneration can be obtained only for oils in which the ageing processes have not gone too far, and therefore oils the stability of which is not recoverable should not be used again in transformers, because they have apparently lost their natural inhibitors (mostly bituminous components) and their regeneration will therefore be short-lived.—" Regeneration of Oils used in Power Stations," V. S. Ivanov, *Elektricheskie Stantsii*, Vol. 23, No. 2, pp. 18–20, 1952, in Russian.

## Composite Conductors

A general relation is presented between the stresses in the stranded wires and the solid core of composite conductors, under the condition that all the wires are uniformly bound and the conductor cross-section remains flat under tensile stresses. Considering elastic and thermal expansions, the stress distribution for equal total extension is first determined for non-stranded wires of the various materials, the stresses in the stranded wires then being found from this distribution. The total load is distributed on the individual layers according to:

$$P = \sum_{i=0}^{i=n} z_i \cdot \delta_i \cdot f_i \cdot \frac{h_i}{l_i}$$

where $z_i$ is the number of strands in the i-th layer, $\delta_i$ the tensile stress of a strand in the i-th layer, $f_i$ the cross-section of strand, $h_i$ the length of lay and $l_i$ the length of wire of one turn; the relation of the tensile stresses in the stranded and unstranded wire (core) being as follows:

$$\frac{\delta_i}{\delta_0} = \frac{\nu_i^2}{\nu_i^2 + \pi^2 \cdot (1 + \mu)}$$

where $\nu = \frac{h}{2\rho}$, $\rho$ being the distance of the axis of the wire from the axis of the whole conductor. The relation between the elastic and thermal expansions of non-stranded wires of two different materials may, after simplifications, be written in the form

$$\delta_I = \delta_{IIO} \frac{E_I}{E_{II}} + E_I (\alpha_{II} - \alpha_I) t$$

which represents a family of parallel straight lines. From this set of fundamental relations the calculation of the stress distribution is not too difficult and has, obviously, to take into account the torsional moment produced by a certain tensile loading of the conductor. Furthermore, the calculation is based on the assumption of the validity of Hooke's law for aluminium, which is true only within certain limits, and does not consider creep, therefore applies to conditions obtaining prior to the permanent set in the strands which throws all the load on the central core.—" The Stress-Distribution in Composite Conductors," S. Hudler, *E.u.M.*, Vol. 69, No. 4, pp. 85–87, 15th February, 1952, in German.

## Transmission Systems

The two-conductor-earth system, which is the cheapest solution of the problem of three-phase transmission in agricultural districts with a low load density, has some obvious disadvantages connected with the use of earth as a return path. These can be overcome by a " multiplication " of the basic circuit to form four- and six-wire systems. These are operated by the corresponding number (i.e., two and three, respectively) of identical transformers at either end which lie in parallel on three-phase busbars; however, where convenient, operation on six-phase buses is also possible. An analysis of such systems is possible by using what the author calls " grouped " symmetrical components, and is carried out in the paper for double two-phase and double three-phase systems, respectively. Conditions are also investigated on the occurrence of faults, such as conductor interruptions, single-phase short-circuits to earth and transformer breakdowns. The transmitting capacity of a six-wire system is 2·5 times higher than that of a duplex three-phase system of equal specific losses and built with the same conductor weight.—" Economic Transmission Circuits and Methods of Calculating Them," L. E. Ebin, *Elektrichestvo*, No. 1, pp. 23–29, 1952, in Russian.

# NEW PATENTS

## Electrical Specifications Recently Published

*The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 27th August from the Patent Office, 25, Southampton Buildings, London, W.C.2.*

**1947**

695. Marconi's Wireless Telegraph Co., Ltd.—Electron discharge tube arrangements of the magnetron type. 8th January, 1947. (677881.)

8217. Standard Telephones & Cables, Ltd., and Earp, C. W.—Radio direction finders. 25th March, 1948. (678148.)

10680. McGee, J. D., Lubszynski, H. G., and Webley, R. S.—Cathode-ray tube apparatus. 25th March, 1948. (677983.)

19615. Standard Telephones & Cables, Ltd., and Reeves, A. H.—Telecommunication electric pulse systems. 16th July, 1948. (677984.)

19616. Standard Telephones & Cables, Ltd., and Reeves, A. H.—Electric counting circuits. 16th July, 1948. (677985.)

24694. Sylvania Electric Products, Inc.—Luminescent screens and method of manufacture. 8th September, 1947. (677882.)

**1948**

9926. Faudell, C. L.—Circuit arrangements for producing a unidirectional voltage from a sawtooth current in an inductance. 29th March, 1949. (678156.)

12089. Standard Telephones & Cables, Ltd., Hough, G. H., and Baker, L. C.—Electric discharge devices. 29th April, 1949. (677883.)

12123. Philco Corporation.—Electronic discharge tubes. 3rd May, 1948. (677986.)

12489. Standard Telephones & Cables, Ltd., Hough, G. H., White, C. de B., and Rivers, W. D. R.—Electric discharge tubes. 29th April, 1949. (677884.)

15321. Philips Electrical, Ltd.—Systems for the transmission of stationary or animated coloured images. 7th June, 1948. (678159.)

25847/8/9. Philco Corporation.—Electronic discharge tubes. 4th October, 1948. (677990/1/2.)

32244. Faudell, C. L.—Circuits for applying modulating potentials to cathode-ray tubes. 14th December, 1949. (677993.)

32452. British Thomson-Houston Co., Ltd., Wells, R. S., and Ward, H. F.—Fluorescent screens. 20th October, 1949. (677888.)

**1949**

999. Marconi's Wireless Telegraph Co., Ltd., and Colchester, C. D.—Radar display apparatus. 27th October, 1949. (677994.)

1779. Marconi's Wireless Telegraph Co., Ltd., and Mortley, W. S.—Frequency dividers. 22nd December, 1949. (678162.)

4656. Standard Telephones & Cables, Ltd., and Hough, G. H.—Electric discharge devices. 21st February, 1949. (677895.)

5588. Modern Telephones (Great Britain), Ltd.—Intercommunication telephone systems. 28th February, 1950. (677894.)

7783. Collins, L. G.—Fence electrifying apparatus. 22nd March, 1950. (677997.)

9933. General Electric Co., Ltd., and Welch, E. E.—Deposition of powdered materials on surfaces by sedimentation. 12th July, 1950. (678165.)

10765. General Electric Co., Ltd., and Dale, S. H.—Electric current conversion systems. 24th April, 1950. (677999.)

20515. Mole, G. T.—Electric fires. 8th August, 1950. (678220.)

22291. Recorded Sound, Ltd.—Telephone apparatus. 28th August, 1950. (678093.)

22448. Electric & Musical Industries, Ltd.—Cathode-ray tube circuits. 30th August, 1950. (678173.)

22627. Eisenburger, K.—Electric resistance welding machines. 31st August, 1949. (678010.)

23880. Wilcox & Co., Ltd., E., and Wilcox, E.—Electric fuse holders. 12th September, 1950. (678012.)

23963. Modern Telephones (Great Britain), Ltd., and Ivens, E.—Intercommunication telephone systems. 15th September, 1950. (677911.)

25177. English Electric Co., Ltd.—Electric supply systems. 22nd September, 1950. (678016.)

25502. Shipton & Co., Ltd., E., Alden, L., and Davis, L.—Loudspeaking telephone apparatus. 4th October, 1950. (678096.)

26137. Marconi's Wireless Telegraph Co., Ltd.—Radar systems. 13th July, 1950. (677913.)

26986. General Electric Co., Ltd., and Rycroft, J. L.—Electric water heaters. 6th October, 1950. (678226.)

27083. English Electric Co., Ltd.—Electrically-propelled vehicles. 16th October, 1950. (678018.)

30161. General Electric Co., Ltd., and Price, L. D.—Electric transformers or concentrators for use with high-frequency electric induction heating apparatus. 24th November, 1950. (677918.)

31231. Ferranti, Ltd., and Duerden, F.—Acoustic delay lines. 1st March, 1951. (677919.)

32212. Aluminum Co. of America.—Sheathing of cables. 15th December, 1949. (678229.)

32381. Siemens Electric Lamps & Supplies, Ltd., and Cumming, H. W. L.—Circuit arrangements for electric discharge lamps. 18th December, 1950. (677920.)

33242. Chilton Aircraft Co., Ltd., and Combi, A.—Winding of armature coils and means therefor. 21st December, 1950. (678023.)

**1950**

200. Telephone Manufacturing Co., Ltd.—Electrical indicating apparatus. 4th January, 1951. (678104.)

734. Philips Electrical Industries, Ltd.—Luminescent substances for electric discharge tubes. 11th January, 1950. (677922.)

3252. English Electric Co., Ltd.—Engine-electric vehicles. 8th February, 1951. (677925.)

5497. Debrie, A. V. L. C.—Mountings for apparatus having optical and electrical elements. 3rd March, 1950. (677930.)

5790. Marconi's Wireless Telegraph Co., Ltd.—Voltage stabilizer circuits, output potentiometer circuits and the like. 27th October, 1950. (677931.)

5841. Garrett Corporation.—Oscillatory current attenuator. 8th March, 1950. (677932.)

5856. Standard Telephones & Cables, Ltd.—Coaxial electric cable joints. 2nd March, 1951. (678236.)

6716. Masteradio, Ltd.—Television receivers. 19th March, 1951. (678034.)

6828. Compagnie Industrielle des Téléphones.—Receiving stations for transmission systems with suppressed carrier wave. 20th March, 1950. (678079.)

6881. British Thomson-Houston Co., Ltd.—Mount structure for electric incandescent lamps. 20th March, 1950. (678037.)

7023. British Thomson-Houston Co., Ltd., and Fardon, G. E.—Lighting systems for motor vehicles. 19th March, 1951. (678039.)

8211. Automatic Telephone & Electric Co., Ltd.—Electric ribbon cable. 19th March, 1951. (678042.)

8763. Philips Electrical Industries, Ltd.—Electron microscopes. 6th April, 1950. (678048.)

9382. British Thomson-Houston Co., Ltd.—Base assembling apparatus for electric lamps. 17th April, 1950. (678111.)

9477. Ateliers de Constructions Electriques de Charleroi.—Magnetic sound recorders. 18th April, 1950. (678067.)

11384. British Thomson-Houston Co., Ltd., and Maggs, A. H.—Dynamo-electric machines. 19th March, 1951. (678052.)

13042/3 & 13501. British Thomson-Houston Co., Ltd.—Dynamo-electric machines. 24th & 30th May, 1950. (677940/2.)

15363. Westinghouse Electric International Co.—Three-phase magnetic core structures. 20th June, 1950. (677946.)

17094. Marconi's Wireless Telegraph Co., Ltd.—Thermionic valve phase splitting circuit arrangements. 13th March, 1951. (678060.)

17373. Marconi's Wireless Telegraph Co., Ltd.—Thermionic valve amplifier arrangements. 15th March, 1951. (678061.)

18404. Brush Development Co.—Moisture-proof piezo-electric crystal element. 24th July, 1950. (677947.)

20798. Metropolitan-Vickers Electrical Co., Ltd.—Electrical surge-protective devices. 22nd August, 1950. (677949.)

24426. Westinghouse Electric International Co.—Electrical insulation and cooling of electrical apparatus. 6th October, 1950. (677954.)

25766. British Thomson-Houston Co., Ltd.—Synchronous induction motors. 23rd October, 1950. (677956.)

26600. Crane Packing Co.—Electronic overload control for motors. 31st October, 1950. (677958.)

29616. Philips Electrical Industries, Ltd.—Devices comprising an automatically frequency-corrected oscillator. 4th December, 1950. (677963.)

30600. Philips Electrical Industries, Ltd.—Cathode-ray tubes. 15th December, 1950. (678072.)

**1951**

104. British Thomson-Houston Co., Ltd.—Electric plug-type connectors. 1st January, 1951. (677964.)

1198. Soc. Nouvelle de Construction de Machines-Outils et d'Outillage Procedes C. W. B.—Electric device for the automatic control of movable machine members. 16th January, 1951. (678253.)

2441. Soc. Anon. de Telecommunications.—Mounting of telecommunication equipment. 31st January, 1951. (678200.)

3576. Westinghouse Electric International Co.—Relay devices using semi-conductive devices. 14th February, 1951. (677969.)

3681. Standard Telephones & Cables, Ltd.—Electric frequency modulating circuits. 15th February, 1951. (677970.)

4973. Welwyn Electrical Laboratories, Ltd.—Connections for electrical resistors. 1st March, 1951. (678076.)

5910. British Thomson-Houston Co., Ltd.—Electron emitters. 12th March, 1951. (678258.)

6114. Dowty Equipment, Ltd., and Snell, M. S.—Push-button electric switches. 14th March, 1951. (678132.)

6134. Union Carbide & Carbon Corporation.—Graphitization of carbon articles by electric heating. 14th March, 1951. (678134.)

6254. Anderson, Boyes, & Co., Ltd.—Flameproof electric switchgear boxes. 15th March, 1951. (678077.)

6396. Philips Electrical Industries, Ltd.—Electromagnetic relay protective arrangements. 14th March, 1951. (678140.)

6514. Philips Electrical Industries, Ltd.—Electrolytic capacitors. 19th March, 1951. (678143.)

**Amended Specification**

623306. Brown Instrument Co.—Standard electric cell.

## Reducing Handling Costs

A SPECIALLY modified battery operated fork lift truck has substantially reduced handling costs at the works of Ensor & Co., Ltd., of Woodville, near Burton-on-Trent, manufacturers of salt-glazed clay drain pipes and clayware products for the building trades. Originally, these heavy, brittle objects were wheeled a few at a time from the company's seventeen kilns to the outdoor stores 200 yd away and there stacked by hand. When required for despatch they were loaded on to trolleys and taken to the waiting lorries or railway wagons where they were manhandled aboard one by one. The introduction of the Ransomes 2-ton fork lift truck has made it possible to abolish this old manual system. Powered by a 20-cell " Exide-Ironclad " battery, the truck has seven forks instead of the usual two, the spacing of these being adjustable to allow for the stacking and loading of pipes with diameters ranging from 4in to 18in. Stacked head to tail, the smaller varieties are now handled in nests of 40 or more at a time, while at the other end of the scale three 15in and two 18in pipes can be dealt with simultaneously. All types are stacked up to 12ft high in the stores. Before the introduction of this specially adapted fork lift truck the loading of eight tons of pipe on to a railway wagon needed the efforts of three men for two hours. Two men working with the truck now do the job in 30 min.

**Loading a nest of 40 salt-glazed clay drain pipes on to a lorry by means of a battery operated fork lift truck**

# CONTRACT INFORMATION

## Accepted Tenders and Prospective Electrical Work

## CONTRACTS OPEN

*Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.*

**Australia.**—BRISBANE.—8th October. State Electricity Commission of Queensland. 132 kV and 66 kV outdoor air break switches for Cairns Regional Electricity Board. (C.R.E. 23333/52. Ten/4290.)*

**Burntisland.**—25th July. Town Council. Electrical installations in 207 houses. Burgh surveyor, Council Offices, High Street.

**Greece.**—ATHENS.—13th August. State Procurement Service of the Ministry of Finance. Fifty portable generating units for the Ministry of Education. (C.R.E. 24521/52. Ten/4327.)*

**Hastings.**—28th July. Town Council. Electrical installation, Primary Junior School, Tivoli. Borough surveyor, Wellington Square.

**India.**—CALCUTTA.—2nd September. Government of West Bengal Electricity Department. Generating plant, transformers, switchgear, and controlling and protective equipment for the Mayurakshi hydro-electric power station. (C.R.E. 24638/52. Ten/4329.)*

**New Zealand.**—DUNEDIN.—20th August. 33 kV switchgear for the Halfway Bush substation. (C.R.E. 23878/52. Ten/4294.)* 33 kV control panels for Port Chalmers and Mosgiel substations. (C.R.E. 23879. Ten/4291.)*

**Pakistan.**—KARACHI.—12th August. Department of Supply and Development. Power transformers and rectifiers. (C.R.E. 24463/52. Ten/4323.)*

**Portuguese East Africa.**—LOURENCO MARQUES.—6th August. Posts, Telegraph and Telephone Department. Supply of telegraphic and electrical equipment. (C.R.E. 23572/52. Ten/4319.)*

**South Africa.**—JOHANNESBURG.—30th July. Stores Department, South African Railways. Lighting fittings. (C.R.E. 24276/52. Ten/4324.)*

**Uruguay.**—MONTEVIDEO.—8th August. Usinas Electricas y los Telefonos del Estado. Auxiliary telephone apparatus. (C.R.E. 23036/52. Ten/4289.)* 15th August. Extension telephones for intercommunication, and spare parts. (C.R.E. 24026/52. Ten/4313.)* 19th August. Copper wire for bobbins. (C.R.E. 23245/52. Ten/4314.)*

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Horse Guards Avenue, Whitehall, S.W.1 (Trafalgar 8855).

## ORDERS PLACED

**Eston (Yorks).**—U.D.C. Supply of electrical equipment for 200 houses (£2,724).—William Marshall (Middlesbrough), Ltd.

**Seaton Valley (Northumberland).**—U.D.C. Electrical installation in 48 houses at Seaton Delaval and 34 at Cramlington.—A. F. Jemison.

**Shipley.**—U.D.C. Rewiring major part of Saltaire Institute (£685).—J. Peirson.

**Swansea.**—Education Committee. Electrical installation work at Clwyd County Primary School (£4,527).—Clarke Bros. (Stroud), Ltd.

**Walthamstow.**—Corporation. Recommended. Electrical installations in 24 houses at Hoe Street/Grosvenor Park Road (£1,186).—Cowlands, Ltd.

**Willesden.**—Borough Council. Recommended. Pram and passenger lifts at Alpha Place, Willesden (£3,888).—Express Lift Co.

Electrical works at the Gibbons Road School (£5,138).—London Electricity Board.

**Wisbech.**—East Anglian Regional Hospital Board. Recommended. Electrical services in connection with alterations to the operating theatre suite at the North Cambridgeshire Hospital, Wisbech (£1,377).—Ely Electrical Co., Ltd.

## CONTRACTS IN PROSPECT

*Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

**Amlwch (Anglesey).**—Fire station; Watkin Jones & Son, 16, Mount Street, Bangor.

**Barlaston.**—Adaptation of "Upper House" as a home for the blind (£22,000); county architect, Stafford.

**Bolton.**—Extensions and alterations to factory; Wolstenholme Bronze Powders, Ltd., Springfield Works, Springfield Road.

**Cheltenham.**—Managerial houses (32), Knapp estate, Charlton Kings; Rainger, Rogers & Smithson, architects to T.C., 29, Rodney Road, Cheltenham.

**Church.**—Aged persons' bungalows at Buckingham Grove (16); U.D.C. surveyor.

**Consett.**—Houses (36) at Moorside for U.D.C.; J. J. Eltringham, architect, Derwent Street, Blackhill.

**Corby.**—Shops on sites at Welland Vale Road and Lodge Park estate; surveyor, The Jamb, Corby, Northants.

**Coulsdon.**—Houses (86) for U.D.C.; A. J. Wait & Co., Ltd., builders, 92, Park Lane, W.1.

**Coventry.**—Proposed civic theatre; D. E. E. Gibson, city architect, Bull Yard, off Warwick Row.

**Croydon.**—Hall for New Addington Baptist Church; E. W. Banfield & Son, architects, 28, Mortimer Street, W.1.

Extensions (£24,200), Cypress Infants' School; borough education architect.

Houses (82), New Addington estate; R. Mansell, Ltd., 17, Grant Road.

**Darlington.**—Houses (35), Heighington, for R.D.C.; Hutton & Hutton, architects. 24, Southend Avenue.

**Eccles.**—Houses (90) and flats (12), Ellesmere Park estate; Roy & Partners, 25, Cross Street, Manchester.

**Hemsworth.**—Dwellings (50), Moorshutt and Kingsley estates, for U.D.C.; C. D. Potter & Sons, 119, Doncaster Road, Barnsley.

**Hounslow.** — Works extensions; Williams (Hounslow), Ltd., Hanworth Road.

**Huddersfield.**—Houses (70), Bradley estate; H. Nuttall, borough architect, High Street Buildings.

**Liverpool.**—Houses, Cornwallis Street (18); F. C. Bloomfield & Co., Ltd., 71, Almonds Green, Liverpool.

School, Springfield, for R.C. authorities (£105,000); Weightman & Bullen, architects, 76, Rodney Street.

**Loftus.**—Bungalows (24) and flats (14), Mars Farm estate, for U.D.C.; C. D. Taylor, architect, 41, Baxtergate, Whitby.

**London.**—LEE.—Church and hall, Horn Park estate; Covell & Matthews, architects, 48, Seymour Street, W.1.

LEWISHAM.—Departmental stores, Lewisham High Street; Littlewoods Mail Order Stores, Ltd.

POPLAR.—Houses (51), Priory Street; borough engineer.

**Macclesfield.**—Alterations and additions at West Park Hospital; J. Price, Nunn & Partners, architects, 180, Oxford Road, Manchester.

**Manchester.** — Proposed home for aged, Chorlton-cum-Hardy; city architect.

Houses at Blackley (235) and flats (29) at Northern Moor; W. J. Simms, Son & Cooke, Ltd., Nottingham.

**Mansfield.** — Houses (58), Debdale Lane estate; A. C. Shepherd, town clerk, Carr Bank.

**Morpeth.**—Houses (40) on the Hadstone site at Broomhill; R.D.C. surveyor, Dacre Street, Morpeth.

**Newcastle-on-Tyne.** — Clothing factory, Blenheim Street; C. Solomon, St. Mary's Place, Newcastle.

Houses (194), Slatyford estate; Cussins (Contractors), Ltd., Jesmond Road, Newcastle.

**Newport (Mon).**—County primary school, Langstone; C. L. Jones, county architect, Queen's Hill, Newport, Mon.

**Oakengates.**—Houses at Furnace Lane site (44), and on Grove estate, St. Georges (26); U.D.C. surveyor, Stafford Road.

**Oldbury.**—Houses at Defford Drive (100), and on Brandhall estate (113); borough engineer, Municipal Bank Chambers, Birmingham Street.

**Oldham.** — Secondary school, Hathershaw; F. Thorpe & Whyman, architects, Barclays Bank Chambers, Oldham.

**Penrith.**—Secondary school at Halfway House for Cumberland C.C.; county architect, Portland Square, Carlisle.

**Plymouth.**—Technical college building and engineering block; A. N. Coles, Contractors, Ltd., Sutton Road, Plymouth.

**Poole.** — Houses (170), Waterloo estate; borough surveyor.

**Rotherham.**—Houses, Kimberworth Park estate; C. Earnshaw (Rotherham), Ltd., Coke Lane, Westgate, Rotherham (66) and Cooper & Kimber, Wood Lane, Wiskersley, Rotherham (58).

**Sheffield.**—Erection of Holt House Primary School; W. Redmile & Sons, 155, Doberoft Road, Sheffield.

**Sherborne.**—Water pumping station, Thornford; A. J. Allen, consulting engineer, Half Moon Street.

**Southgate.**—Classrooms at Benedictine Convent, Linden Way; W. J. Gregory, architect, 34, Millbank, S.W.1.

**Stalybridge.**—Houses (28), Stamford Park estate; W. G. West, Ltd., Whitebank, Brinnington, Stockport.

Branch library at Millbrook; Howard & Benson, architects, 88, Mosley Street, Manchester.

**Swinton.**—R.C. school at Stanwell Road; W. & J. B. Ellis, architects, St. Helens, Lancs.

**Thornton Heath.**—Additions to factory; E. W. Puckert, Ltd., Barnacle Works, Bensham Lane.

**Wakefield.**—Flats (48), Eastmoor; A. Hanks & Son, Ltd., Lee Moor, Stanley.

**West Bromwich.**—Houses and flats (70), Hateley Heath estate; Wm. Kendrick & Sons, Ltd., Tasker Street, Walsall. Houses (24), Harvills Hawthorn estate; S. J. Smith (Bidford), Ltd., Smith Road, Wednesbury.

**Whetstone.** — Flats (24), Denham Road; Braddock & Martin-Smith, architects, East Gallery, St. John's Church, N.W.8.

**Whittlesey.**—Houses (80); Ruddle & Wilkinson, Longcauseway Chambers, Peterborough.

**Wigan.**—R.C. school at Baytree Road; Weightman & Bullen, architects, 31, Dale Street, Liverpool.

Reconstruction of premises in Hallgate for Joan Barry, Ltd.; Hawthorn Construction Co., Bootle.

**Wimbledon.** — Dwellings (30), Wimbledon Common and Gap Road; borough engineer.

**Worksop.** — Houses at Manton for T.C.: Morris, Oldfield & Co., Ltd., South Royds, Oldcote, near Worksop (10), J. H. & W. E. Illett, Ltd., Dock Road, Worksop (22) and T. J. & A. B. Jackson, 438 Gateford Road, Worksop (22).

**Worsley.**—Development of large estate for housing, Little Hulton (over 1,000 dwellings); U.D.C. surveyor, Town Hall, Walkden, near Manchester.